데이터베이스 인터넷 서점을 위한 DB구축 프로젝트

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1. **인터넷 서점을 위한 DB 구축 (과제 달성 4조건 중 3번 항목)**

**조건 1. 각 서적에 대한 정보는 isbn번호, 제목, 저자, 페이지수, 가격, 출판사 주제 등이 입력됨**

: 이 테이블의 superkey가 될 수 있는 후보는 ISBN번호와 제목이 될 것이다.

그런데 본 과제를 수행하면서는 ISBN은 다른 테이블의 KEY로 사용할 계획이므로, 책의 이름을 본 테이블의 superkey로 지정할 것이다. 또 이외의 과제 달성 조건 중에 공저자들을 출력하는 것이 있는데, 때문에 그에 도움을 줄 속성인 ‘공저자 수(joint\_number)’라는 attribute를 추가하기로 한다.

즉 서적에 대한 정보는 **책 이름, isbn 번호, 출판사 이름, 작가 이름, 가격, 페이지 수, 주제, 공저자 수**를 담게 될 것이다.

**조건 2. 출판사에 대해서는 이름, 주소, 전화번호가 기록되고 각 서적에 대한 출판 날짜 기록**

: 출판사 테이블이 담을 속성 중 이름(key), 주소, 전화번호는 언급할 내용이 별로 없으나, 서적에 대한 출판 날짜는 여러 개를 담아야 하는 문제가 생긴다. 이에 관해서는 달성 조건 2 – Database Schema 설계에서 자세히 다루도록 한다.

**조건 3. 서적의 주제는 다수의 관련 주제를 가질 수 있음**

**:** 이로 인해 주제에 관련된 테이블을 따로 만들 것이며, 이 테이블에는 **본 주제** 뿐 아니라 **관련 주제 1, 2, 3**을 하나의 스키마에 포함하도록 할 계획이다.

**조건 4. 고객은 가입 시 id, 이름, 주소, 전화 번호 입력**

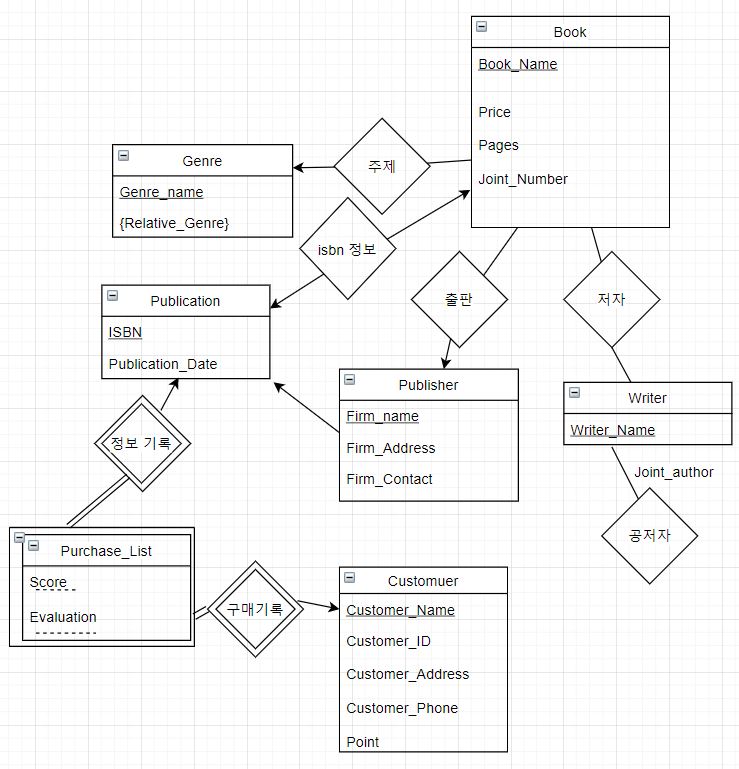
: id를 key로 할 것이며, 위 네 속성은 null이여서는 안된다. 추후 작성할 트리거를 위해 ‘포인트’라는 속성을 추가하여 고객 테이블은 **id, 이름, 주소, 전화 번호, 포인트**의 5가지 속성을 지니게 된다.

**조건 5.** 각 서적 구입에 대한 정보 기록, 서적 구입 후 서평과 평점 작성시 포인트 1점 부여

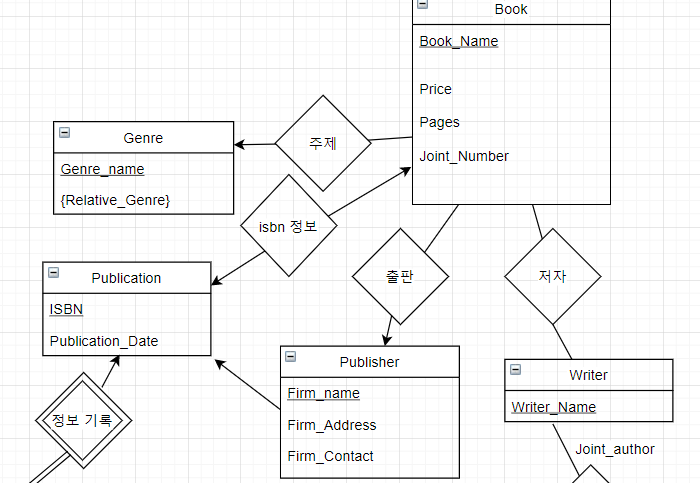
**:** 이를 위해 ‘구매 리스트’라는 테이블을 따로 작성하기로 한다. 이 테이블에는 **고객 이름, 점수(평점), 서평, isbn번호** 속성들을 포함시킬 것이다.

1. **DB설계 (과제 달성 4조건 중 3번 항목)**
2. **ER – Diagram**

* 본 과제를 완성시키기 위해 구상한 테이블 수는 총 8개로, **book, customer, enrolled\_list(작가와 책의 관계에 대한 데이터), genre(주제), publication(출판에 관한 데이터), publisher(출판사), purchase\_list(구매 기록), writer**이 될 것이다.
* 아래 그림은 작성한 ER-Diagram이다. 이는 두 가지의 큰 특징으로 나눌 수 있는데, 아래에서 설명하도록 한다.

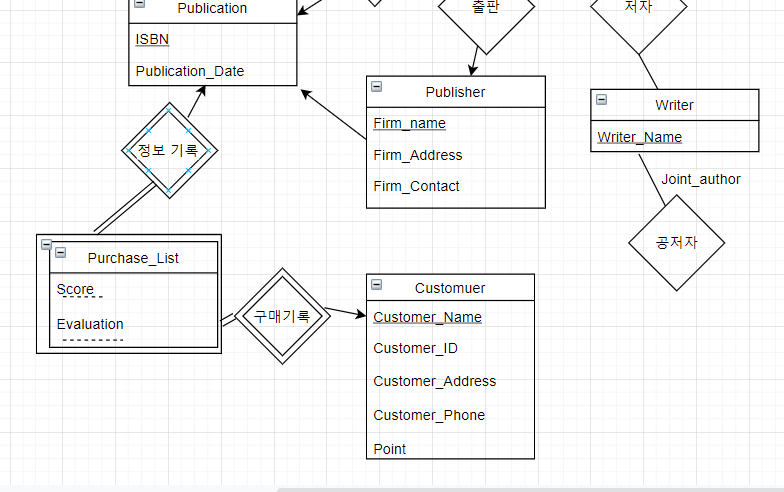


1. **Book과 주변 entity들과의 관계**



* Book은 책의 이름을 자신의 key로 가진다.
* Genre\_name, ISBN, Firm\_name(출판사명), Writer\_Name 등은 foreign key로 참조하여 다른 table에서 가져오고, 테이블로 구현되었을 때 이들의 속성을 가지게 될 것이다.
* publication은 isbn번호를 키로 가지게 될 것이며, 이들의 정보는 책과 1:1로 대응하므로 one to one의 관계를 가진다. 저자와 책은 서로 多 대 多 관계를 가질 수 있으므로 화살표 마크 없는 단일 라인으로 그렸으며, 나머지는 1:多 관계를 가지게 될 것이다.

1. **Weak entity set : purchase\_list와 공저자 Role**



* Purchase\_List entity는 weak entity set으로, publication과 customer의 키가 없으면 존재할 수 없다. Purchase\_list entity의 score와 evaluation은 각각 평점과 서평인데, 이들은 구매자와 구매한 책(isbn도 책을 식별하는 키의 역할을 할 수 있으므로)이 없다면 존재할 수 없는 것이기 때문이다.
* 과제 조건에 ‘공저자’ 개념이 있다. 즉 책 하나에 여러 명의 작가가 있을 수 있다는 것인데, 이 문제를 해결하기 위해 writer의 name으로만 구성된 테이블을 작성해야 한다. (한 속성에 대해 다수의 값을 가져야 하기 때문) 따라서 Role을 통해 공저자들을 포함한 테이블을 만들 것이다.

1. **Database Schema**

* **oracle DB상에서 이들 table을 create한 텍스트 파일 링크는 다음과 같다. 다음 주소에서 과제에 이용된 삽입문과 ddl text파일을 확인할 수 있다.**

**:** [**https://github.com/sortinghyeok/Assignments**](https://github.com/sortinghyeok/Assignments)

* **데이터베이스 스키마와 그에 대한 설명은 아래에 기술하도록 한다.**

1. **Writer**

* Writer( Writer\_name )
* 가장 간단한 테이블이다. 작가 테이블에는 그들의 이름만을 넣을 것이며, 밑줄을 그은 것을 보면 알 수 있듯 key가 되어 외부에서 foreign key로서 활용되는 데에 더 큰 의미를 가지게 된다. 공저자 문제를 해결하기 위해 이를 통해 새 테이블도 작성할 것이다.

1. **Genre**

* Genre(Genre\_Name, Relative\_Genre1, Relative\_Genre2, Relative\_Genre3)
* Genre\_Name을 키로 가지고, 아예 주제 테이블 자체에 연관 주제들을 속성으로서 포함시켰다. 다만 이들은 중복된 속성 값을 2개 이상 가질 가능성도 있기에 4NF로서 정규화 될 수 있다. 그것에 관해서는 아래 정규화 항목에서 다루도록 한다.

1. **Publisher**

* Publisher(Firm\_name, Firm\_Address, Firm\_contact, Publication\_Date)
* 출판사는 과제에서 주어진 조건과 크게 다르지 않으나, Publication\_Date, 즉 출판일은 다른 테이블에서 참조해서 가져올 속성이다.
* key로써 출판사명인 Firm\_Name을 사용할 것이다.

1. **Enrolled\_List**

* Enrolled\_List(ISBN, Writer\_Name, Joint1, Joint2)
* 이 테이블은 위 ER-diagram에서 공저자 Role에 isbn 속성을 참조해서 새로 등장한 테이블이다.
* 데이터베이스 강의자료의 선수과목 테이블과 같이 키가 존재하지 않으며, 외부 키로서 Joint들은 WriterName을 받아온다. 따라서 이 테이블에는 Writer table을 참조하는 속성이 3개이다.

1. **Publication**

* Publication(ISBN, Publication\_Date)
* 이 테이블은 ISBN을 주 키로 하여, 다른 테이블에 ISBN이 Foreign key로서 활용될 것이다.
* Publication\_Date는 테이블에서 이들을 참조하는 것을 허용 하기 위해 unique 속성을 넣었는데, 이렇게 되면 각각의 출판 날짜 하루가 하나의 책에만 대응되게 된다. 이는 현실 세계에서는 일어나기 어려운 문제이지만, 다음과 같은 이유로 인해 테이블을 이렇게 작성하였다.

1. ISBN은 Book Table에서 book\_name과 함께 primary key로 지정될 수도 있었으나, Book\_name과 isbn을 같이 primary key로 지정해버린다면 복수 컬럼을 기본 키로 지정했기에 **다른 테이블에서 book\_name을 참조할 때에 필요가 없는 isbn까지 같이 참조해야하는 문제**가 발생한다.
2. **‘출판사 테이블에서는 출판 일자를 가지고 있다’라는 과제 조건**이 있는데, 출판사가 책에 대한 정보도 없이 복수의 출판일자를 가지고 있는 것은 불가능하다. 따라서 c의 문제가 야기된다.
3. 따라서 ISBN 또는 Book\_name을 출판사 테이블의 외부 키로 가져와야 한다. 그러나 아래에서 기술할 book\_table에는 출판일자 속성을 가지고 있지 않다. 따라서 이를 해결하기 위해 d의 두 가지 방법을 알게 되었다.
4. 1번. Book\_name에 출판일자 속성을 추가하고, 이를 출판사 테이블에서 book\_name (또는 isbn)과 함께 외부키로 가져오거나

2번. ISBN과 출판일자를 가지고 있는 테이블을 만들어 이 테이블 속성을 외부키로 가져오거나 하는 두 가지 방법이 있다.

그러나 **두 가지 방법 모두 publication\_date(출판 일자)를 key 또는 unique로 해주지 않으면 참조가 불가능하다.**

1. **Book**

* Book(Book\_Name, ISBN, Firm\_Name, Writer\_Name, Prices, Pages, Genre\_Name, Joint\_Number)
* key인 Book\_name 외에 ~Name의 속성들은 다른 테이블을 참조하여 가져온 속성값이다.
* Prices, Pages, JointNumber는 각각 책 값, 페이지 수, 공저자 수의 값을 가질 것이다.
* 문제 조건은 Writer\_name 속성을 가지는 것인데 공저자가 있으므로 대표 저자만을 속성 값으로 갖는다.

1. **Customer**

* Customer( Customer\_ID, Customer\_Name, Customer\_Address, Customer\_PhoneNum, Point)
* Customer\_id가 주 키이다. 나머지는 각각 소비자 이름, 소비자 주소, 소비자 전화번호, 그리고 트리거로 인해 값이 누산될 Point 값을 가지는 속성들이다.

1. **Purchase\_List**

* Purchase\_List(Customer\_ID, Score, Evaluation, ISBN)
* 모든 속성값이 외부 키를 가져오는 테이블로, 다른 테이블이 하나라도 존재하지 않으면 이 테이블은 존재하지 못한다.
* 이 테이블의 존재 의의는 서평과 평점의 작성, 그리고 트리거의 동작이며, 트리거의 동작에 관해서는 아래에서 설명하도록 한다.

1. **서평과 평점 입력 후 포인터 부여 트리거**

* **문제의 해결 방법은 서평과 평점이 입력된 후에 Customer 테이블의 point를 point +1 로 올려주는 것이다.**
* **이를 위해 Purchase\_List table을 설계하였는데, Purchase\_List의 Customer\_ID 속성과 그 Customer table의 Customer\_ID 값이 같고, Score과 evaluation(평점과 서평)이 null이 아니라면 point = point + 1을 해주면 된다. 이 설명과 동일한 코드가 바로 아래와 같다.**

create or replace trigger addPoint

AFTER insert or update of SCORE, EVALUATION on PURCHASE\_LIST

FOR EACH ROW

BEGIN

if :new.score is not null and :new.evaluation is not null

THEN

update CUSTOMER C

set C.point = C.point+1

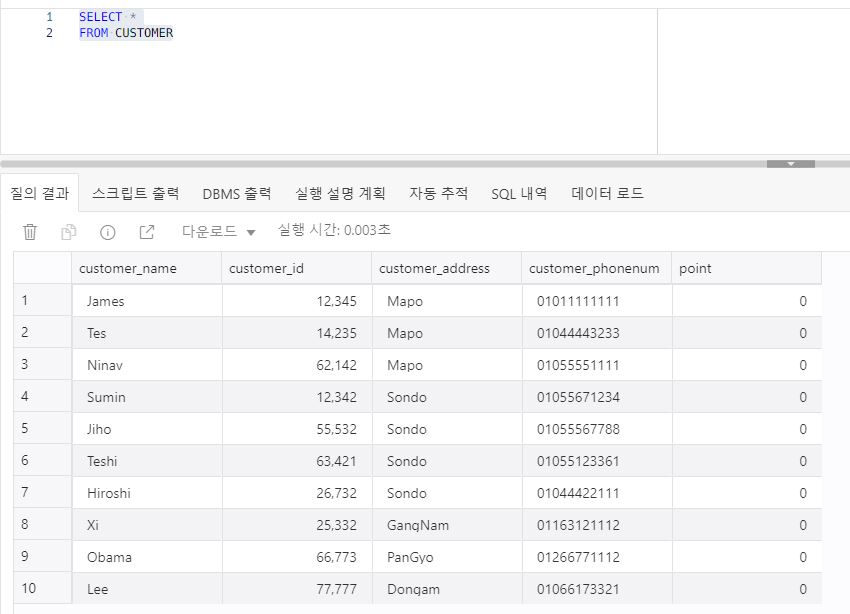
where C.CUSTOMER\_ID = :new.CUSTOMER\_ID;

END IF;

END;

* 이 코드에 대해 투플의 업데이트와 평점과 서평이 적힌 투플의 삽입 두 가지 경우에 대해서 정상 실행되는 지 확인한 결과는 아래와 같다.

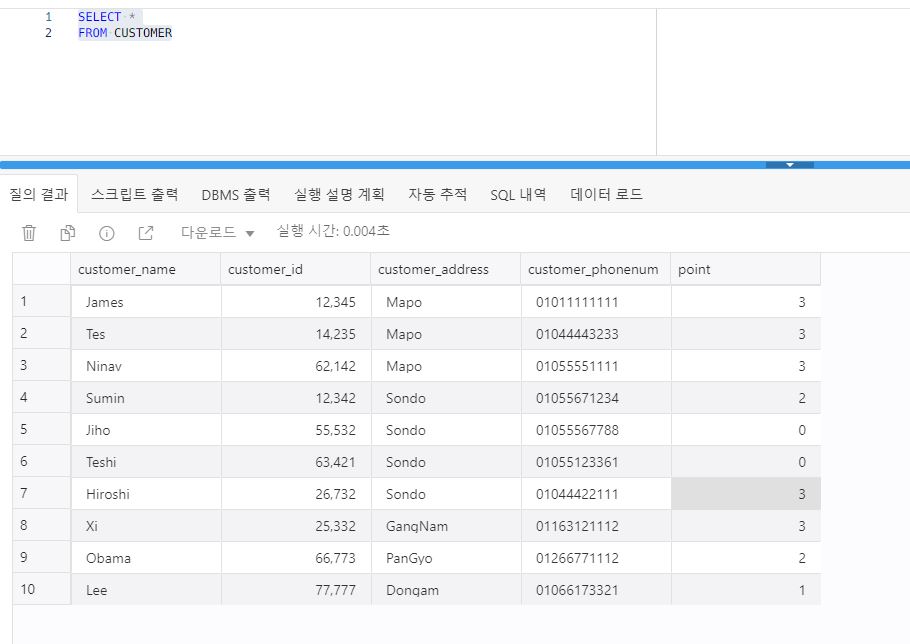
1. 평점과 서평이 있는 투플의 삽입의 경우



* 위는 초기 테이블 상태이며, 아직 Purchase\_List의 서평과 평점이 update되지 않은 상태이다.



* 위와 같이 20개의 투플을 Purchase\_List에 삽입한 경우 아래와 같은 결과가 나와 정상 작동함을 확인하였다.



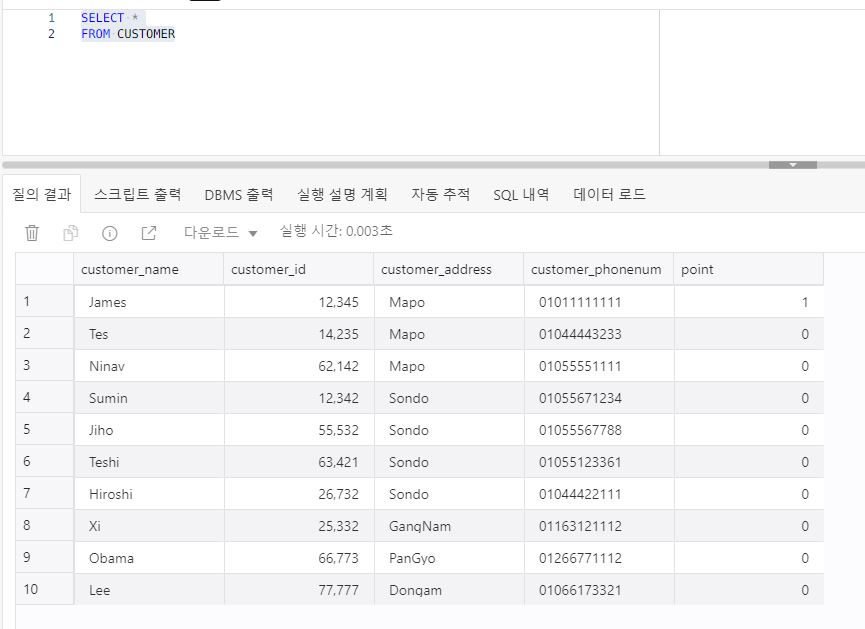
1. 존재하는 투플의 평점과 서평 업데이트의 경우

* 먼저 위의 실험을 진행한 뒤 모든 포인트에 대해 0으로 초기화 해준 후, 아래와 같은 update문을 실행하였다.

![텍스트이(가) 표시된 사진

자동 생성된 설명](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAYABgAAD/4RDQRXhpZgAATU0AKgAAAAgABAE7AAIAAAADSkgAAIdpAAQAAAABAAAISpydAAEAAAAGAAAQwuocAAcAAAgMAAAAPgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAFkAMAAgAAABQAABCYkAQAAgAAABQAABCskpEAAgAAAAM4NAAAkpIAAgAAAAM4NAAA6hwABwAACAwAAAiMAAAAABzqAAAACAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA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* 그 결과 아래와 같이 대상에 대한 포인트 업데이트가 완료되었음을 확인하였으며, 이로써 트리거가 정상 작동함을 확인하였다.



1. **샘플 데이터 입력**

* 이 부분에 대해서는 **2-B Database Schema**의 도입부에서 삽입문을 포함한 텍스트 파일이 있는 주소를 적어놓았다. 삽입문의 특성상 동일한 패턴의 반복이므로, 아래의 포괄적 설명으로 D.샘플 데이터 입력에 대한 설명을 한다.
* **:** [**https://github.com/sortinghyeok/Assignments**](https://github.com/sortinghyeok/Assignments)

1. 삽입데이터는 저자 10명, 서적 20권, 2인 공저 5건, 3인 공저 3건, 주제 7개, 관련 주제 10개, 고객 10명, 구매 20건, 서평 및 평점 10건 이상이라는 조건을 맞췄다.
2. 주제는 7개인데 관련 주제가 10개라는 부분이 모호하여, 7개의 서로 다른 주제(genre)를 가진 책이 있을 때, 7가지 책의 관련 주제의 총합이 10이며, 이들 10개의 값이 7개의 주제에서 벗어난 새로운 값이 아니라는 것으로 해석하였다.
3. 과제 조건에서 고객 정보는 처음 가입 시 고객 id, 이름, 주소, 전화 번호를 입력한다고 하였는데, 이들이 null값을 가지면 안된다는 쪽으로 해석하여 create 및 insert문을 작성하였다.
4. **정규화 (과제 달성 4조건 중 3번 항목)**

* 정규화의 순서는 다음을 고려하여 진행하였다.

1. 1NF의 조건인 모든 속성의 domain이 분리되지 않는 것은 모든 입력 데이터에서 성립한다. 따라서 아래에서 이는 따로 언급하지 않는다.
2. BCNF를 만족할 경우 2, 3차 정규화는 성립하므로, BCNF를 만족하는 가를 우선적으로 확인. 즉, 모든 결정자가 superkey인가를 확인한다. 그렇지 못하다면, 이를 Decompositon한다.

* 분리한 두 테이블이 함수 종속성을 만족하는 지 확인하여 BCNF를 만족하는 지 확인한다.

1. Multivalued 속성이 두 개 이상인 지를 확인한다. 즉 4NF를 만족하지 않는 지를 확인하고, 만족하지 않는다면 분리하여 4NF화 해준다.

* 그러나 모든 tuple을 확인하면서 표를 작성하는 것은 어려움이 있으므로 중복이 발생할 수 있는 가능성에 대하여 4NF를 해주기로 한다.

1. **Writer(Writer\_Name)**

* 이 테이블은 column이 하나이며 주 키인지라 결정자가 모든 것을 결정한다. 즉 bcnf가 성립하고, 4NF도 만족한다.

1. **Genre(Genre\_Name, Relative\_Genre1, Relative\_Genre2, Relative\_Genre3)**

* 이 테이블은 모든 속성이 7개의 주제를 나눠 가지는데, 외부 키가 전혀 존재하지 않으며 Relative\_Genre들은 user이 준 값을 그대로 받았을 뿐으로 다른 속성을 결정할 방법이 없다. **즉 결정권자가 Genre\_Name 하나밖에 없다.** 따라서 Relative\_Genre2 -> Relative\_Genre3와 같은 것이 당초에 성립하지 않기에 BCNF가 성립한다. (R(A, B, C, D)), F = {A -> B, A-> C, A-> D}

또한 Relative\_Genre들을 1, 2, 3까지 해놓은 이유는 multivalued column을 만들지 않기 위해서 였으므로, 4NF를 만족한다.

1. **Customer(Customer\_Name, Customer\_ID, Customer\_Address, Customer\_PhoneNum, Point)**

* 이 테이블 또한 결정자가 Customer\_ID(key) 밖에 존재하지 않는다. 따라서

BCNF를 만족한다.

* 기본적으로 모든 테이블의 속성은 중복된 값이 삽입되지 않는 것을 전제로 한다. 삽입문을 작성 할 때에 일반 컬럼에 중복값을 넣지 않아서 별도의 수정이 없다는 가정하에는 4NF를 해 줄 필요는 없겠으나, 만약 phone\_Num, Customer\_Name같은 속성에 중복된 값이 add된다고 가정하면 다음과 같이 분리해줘야 한다.

R1(Customer\_Name, Customer\_ID, Customer\_Address)

, R2(Customer\_ID, Customer\_PhonNum)

1. **Enrolled\_List(ISBN, Writer\_Name, Joint1, Joint2)**

* 이 테이블은 모두 외부키로 이루어진 특이 케이스이다. 그런데 Writer\_Name, Joint1, Joint2는 모두 Writer table의 Writer\_Name 속성값일 뿐이고 Writer table 내에서 서로 어떠한 관계도 가지지 않는다. 사실상 테이블 명을 (ISBN, Joint1, Joint2, Joint3)로 바꿔도 다를 바가 없고, ㄴ.Genre table과 똑 같은 예라 볼 수 있다.
* 따라서 결정자가 ISBN 밖에 없기에 BCNF를 만족한다.
* 그러나 ㄴ.Genre table에서와 같이, Writer 테이블의 같은 컬럼(Writer\_Name) 속성 값 3가지를 뽑아 참조하는 것이므로 중복이 나타날 수 없다. 애초에 같은 테이블에서 같은 attribute를 세 가지 뽑아온 이유가 multivalued 속성을 만들지 않기 위해서이다.

1. **Publication(ISBN, Publication\_Date)**

* 이 테이블은 ISBN과 Publication\_Date 모두가 같은 테이블 내부 속성임과 동시에 결정자이면서 서로 unique값이기에 BCNF와 4NF를 모두 만족한다.

1. **Publisher(Firm\_Name, Firm\_Address, Firm\_Contact, Publication\_Date)**

* 위의 스키마 부분(2-B-ㅁ)에서 설명한 이유에 의해 Publication\_Date는 고유값으로 선언되어 불가피하게 Publication\_Date -> Firm\_Name이 성립한다. 동시에 Firm\_Name은 나머지 모든 속성의 Super key이다. 때문에 BCNF를 만족하지 않으며 이를 Decompostion하면

R1(Firm\_Name, Firm\_Address, Firm\_Contact), R2(Firm\_Name, Publication\_Date)로 나눌 수 있다. 이들은 BCNF를 만족한다. 또한 설계상에서 multivalued로 생각하지 않았으나, firm\_contact와 같은 속성이 중복된다고 해도 multivalued 속성이 하나밖에 없으므로 4NF를 만족한다.

1. **Purchase\_List(Customer\_id, Score, Evaluation, isbn)**

* Customer\_id와 isbn이 외부키이지만, 서로 관련은 전혀 없고 각각의 속성이 소속된 원래 테이블(Customer과 Publicaiton)에서 불러온 속성값이 하나도 없다.

또한 Score와 Evaluation중에서도 키 값이 없고 중복도 허용되는 값이므로 결정자가 아예 존재하지 않는다.

따라서 이 테이블은 bcnf를 논할 수 없기에 2NF와 3NF에 대해 조건을 확인한다.

2NF를 위해서는 함수 종속 관계에 근거해 중복되는 데이터에 대해 다른 테이블로 분리해야 한다. 그러나 이 테이블은 결정자가 없어 종속 관계가 존재하지 않는다. (어떠한 집합으로 묶던 간에 중복되는 데이터가 나올 수 있다.)

때문에 중복되는 값을 없애려면 하나의 속성만이 하나의 테이블을 구성하는 식으로 해야하는데 그렇게 되면 테이블 간의 연결고리가 존재하지 않게 된다.

따라서 이 테이블은 1NF만을 만족한다.

1. **Book(Book\_Name, ISBN, Firm\_Name, Writer\_Name, Prices, Pages, Genre\_Name, Joint\_Number)**

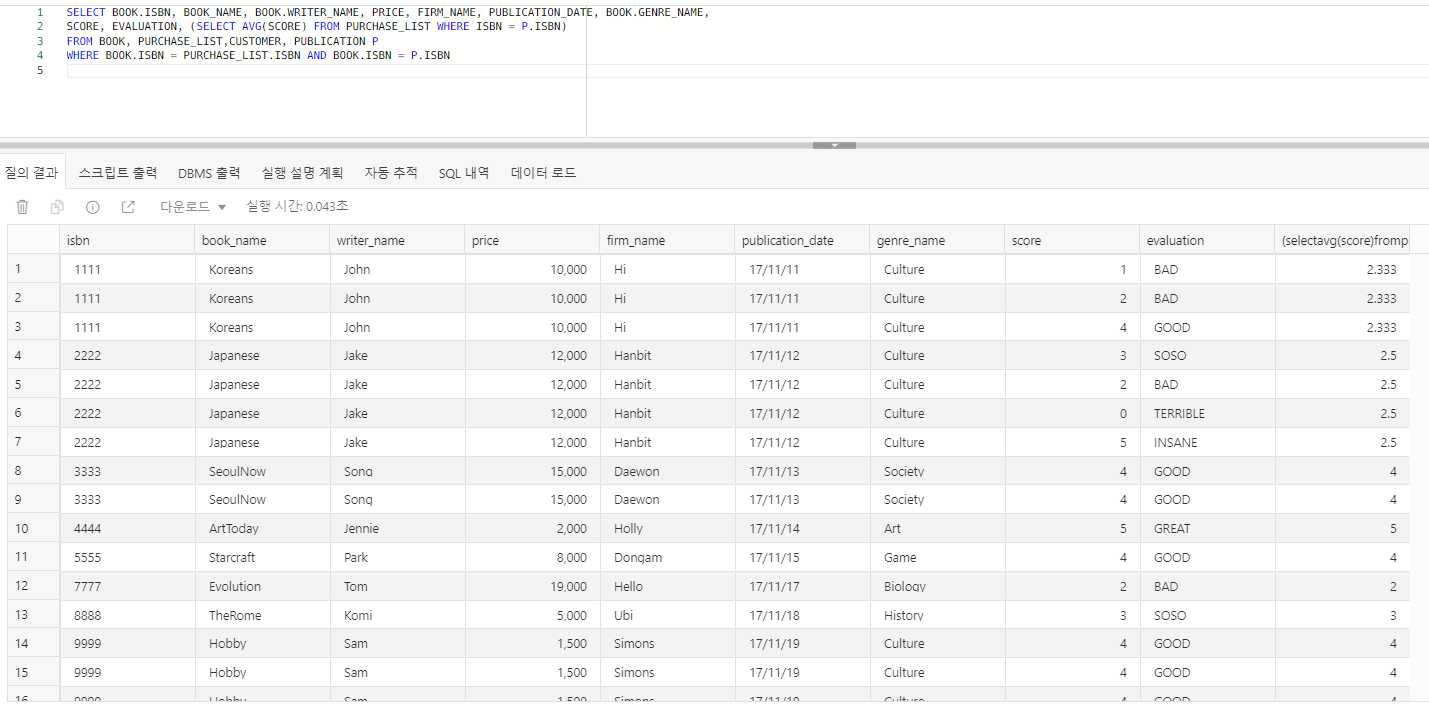
* Super Key인 Book\_Name외에 결정자로는 ISBN이 있다. Book\_Name은 다른 모든 속성을 결정할 수 있으며, ISBN 또한 그렇다. 때문에 둘 모두 후보 키이므로 BCNF를 만족한다.
* 이 테이블에서 중복될 수 있는 속성 값은 Writer\_Name 뿐이다. 즉 중복이 된다고 하더라도 하나의 속성만이 중복된다. 따라서 4NF를 만족한다.

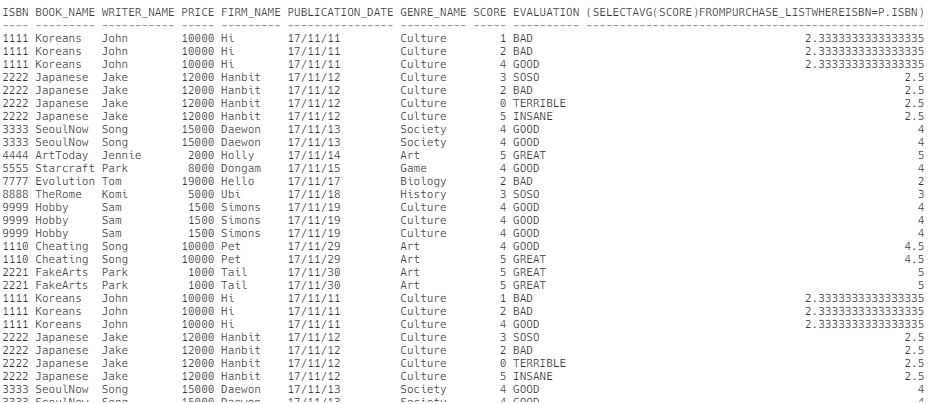
1. **질의 실행 및 결과 제시 (과제 달성 4조건 중 4번 항목)**

* **5개의 질의에 대한 소스코드, 실행 화면(결과 화면)을 제시하고 그에 대한 설명을 한다.**

1. 서적 정보 출력(ISBN 번호, 제목, 저자, 페이지수, 가격, 출판사, 출판 날짜, 주제, 서평, 평균 점수 등)

-주어진 조건에 각 서평이 적힌 TUPLE에 매겨진 점수도 추가하여 출력하였다. 따라서 그냥 **점수도 각각의 TUPLE 별 점수대로 내고 평균 점수도 옆에 붙여서 내주는 걸로 질의를 확장하였다.**

1. 실행 화면
2. 스크립트 출력



1. 질의 코드 :

SELECT BOOK.ISBN, BOOK\_NAME, BOOK.WRITER\_NAME, PRICE, FIRM\_NAME, PUBLICATION\_DATE, BOOK.GENRE\_NAME,

SCORE, EVALUATION, (SELECT AVG(SCORE) FROM PURCHASE\_LIST WHERE ISBN = P.ISBN)

FROM BOOK, PURCHASE\_LIST,CUSTOMER, PUBLICATION P

WHERE BOOK.ISBN = PURCHASE\_LIST.ISBN AND BOOK.ISBN = P.ISBN

* 우선 필요한 모든 테이블을 FROM절에 넣고, SELECT문에 두 PUBLICATION의 값 끼리 비교할 필요가 있으므로 FROM 절의 PUBLICATION에 P라는 ALIAS를 주었다.
* 일반적인 책 ISBN, 책 이름, 작가 이름, 가격 등은 단순하게 그대로 적어준다.
* SELECT문 내부에서 (SELECT AVG(SCORE) FROM ~ WHERE ISBN = P.ISBN)으로 지정해주어 해당 책에 대한 평균 점수도 같이 출력해주었다.

1. 각 저자에 대해 출판한 서적명, 공저자가 있을 경우 공저자명, 출판사, 출판 날짜를 출력하고 총 출판 권수를 단독, 2인 공저, 3인 공저 별로 출력

* 여기서 공저 수에 따른 총 출판 권수라는 것이 모호한데, 해당 질의문에 들어가는 책의 발행부수가 아닌, 작가 개인이 2인 공저로 쓴 모든 책의 종류 권수, 모든 3인 공저로 쓴 책의 종류 권수, 단독으로 쓴 모든 책의 종류 권수라고 생각하고 해당 질의를 진행하였다.

1. 테이블이(가) 표시된 사진

   자동 생성된 설명실행화면
2. 스크립트 출력

테이블이(가) 표시된 사진

자동 생성된 설명

1. 질의 코드

SELECT A.WRITER\_NAME, A.BOOK\_NAME, ENROLLED\_LIST.JOINT1, ENROLLED\_LIST.JOINT2,

A.FIRM\_NAME, PUBLICATION\_DATE,

CASE WHEN A.JOINT\_NUMBER = '1' THEN '1'

WHEN A.JOINT\_NUMBER = '2' THEN '2'

WHEN A.JOINT\_NUMBER = '3' THEN '3'

ELSE 'UNKNOWN' END AS JOINT\_PUBLISHED,

(SELECT COUNT (\*) FROM ENROLLED\_LIST WHERE WRITER\_NAME = AWRITER\_NAME AND JOINT1 IS NULL) SOLO,

(SELECT COUNT (\*) FROM ENROLLED\_LIST WHERE WRITER\_NAME = A.WRITER\_NAME AND JOINT2 IS NULL AND JOINT1 IS NOT NULL) DUO,

(SELECT COUNT (\*) FROM ENROLLED\_LIST WHERE WRITER\_NAME = A.WRITER\_NAME AND JOINT2 IS NOT NULL) TRIO

FROM BOOK A, ENROLLED\_LIST, PUBLICATION

WHERE A.ISBN = PUBLICATION.ISBN AND A.WRITER\_NAME = ENROLLED\_LIST.WRITER\_NAME AND

A.ISBN = ENROLLED\_LIST.ISBN

* SELECT문에 CASE WHEN 조건문부터 설명하도록 한다. JOINT\_NUMBER에 매겨진 숫자는 즉 몇 명이서 썼는 지 인데, 단독이라면 1, 2인 공저라면 2, 3인 공저라면 3의 값을 반환하게 되고 이 컬럼의 이름을 JOINT\_PUBLISHED라고 하였다. 이로써 몇명이서 쓴 책인지 출력이 가능해졌다.
* 다음은 (SELECT COUNT(\*) FROM ENROLLED\_LIST WHERE ~)의 3가지 SELECT문에 대한 설명이다.

해당 SELECT문의 JOINT1, JOINT2등은 대표 저자 외의 저자, 즉 같이 작성을 한 작가 1, 작가 2의 이름이다. 공저자가 1명이라면 JOINT1부터 채워지게 되는데,

즉 공저자가 없다면(단독) JOINT1 IS NULL,

공저자가 1명이라면(2인 저서) JOINT1 IS NOT NULL AND JOINT 2 IS NULL,

공저자가 2명이라면(3인 저서) JOINT2 IS NOT NULL이 조건이 되는 것이다.

이들의 ALIAS를 SOLO, DUO, TRIO라고 하였다.

1. 주제 별 관련 주제 출력(이 때, 관련 주제가 여러 개인 경우 포함)

* 애초에 Genre table은 관련 주제 속성을 최대 3개 가질 수 있게 설계했다. 따라서 질의는 가장 단순한 형태가 된다.

1. 실행 화면

테이블이(가) 표시된 사진

자동 생성된 설명

1. 스크립트 출력

테이블이(가) 표시된 사진

자동 생성된 설명

1. 질의 코드

SELECT \* FROM GENRE

* 기존 테이블이 질의에 필요한 모든 것을 가지고 있어 단순한 질의로 조건을 만족한다.

1. 고객에게 서적 추천. 고객이 구입한 서적의 주제와 관련 주제를 이용하고 공저자가 집필한 서적 추천. 추천 (고객(ID, 이름), 추천 서적(제목과 ISBN번호), 서평, 평점 평균)

* 애초에 Genre table은 관련 주제 속성을 최대 3개 가질 수 있게 설계했다. 따라서 질의는 가장 단순한 형태가 된다.

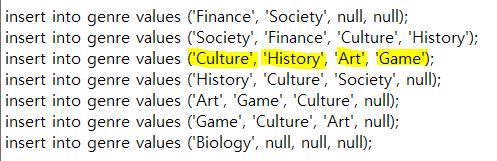
1. ![텍스트, 신문이(가) 표시된 사진

   자동 생성된 설명](data:image/jpeg;base64,/9j/4AAQSkZJRgABAQEAYABgAAD/4RDQRXhpZgAATU0AKgAAAAgABAE7AAIAAAADSkgAAIdpAAQAAAABAAAISpydAAEAAAAGAAAQwuocAAcAAAgMAAAAPgAAAAAc6gAAAAgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAFkAMAAgAAABQAABCYkAQAAgAAABQAABCskpEAAgAAAAMxMwAAkpIAAgAAAAMxMwAA6hwABwAACAwAAAiMAAAAABzqAAAACAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA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   자동 생성된 설명실행 화면

* 첫번째 사진은 평점 평균이 역순으로 출력되었음을 확인시켜주며, 두번째 사진은 관련 주제가 제대로 출력되었는 지 확인하기 위해 고객 Xi가 구매한 책 삽입문이다. 아래 설명을 통해 관련 주제가 제대로 나왔음을 확인할 수 있었다.



* Xi가 구매한 책은 장르가 culture이고, 관련 주제는 ‘History’, ‘Art’, ‘Game’이다.
* 질의테이블이(가) 표시된 사진

  자동 생성된 설명 출력 확인 결과 Xi에게 추천된 책은 모두 추천 장르를 만족한다.

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자동 생성된 설명테이블이(가) 표시된 사진

자동 생성된 설명

* 위 사진들을 통해 관련 주제 책 출력, 평점 역순 규칙, 공저자 책 출력 조건을 모두 만족했음을 알 수 있다.

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A.GENRE\_NAME = G.GENRE\_NAME AND B.GENRE\_NAME = G.RELATIVE\_GENRE1 OR

B.GENRE\_NAME = G.RELATIVE\_GENRE2 OR B.GENRE\_NAME = G.RELATIVE\_GENRE3

조건들을 넣어 구매자(Book A와 natural join됨)의 책 주제와 같거나 관련 장르들을 출력되게 한다.

* Enrolled\_List에 공저자 속성이 있으니, where절에

ENROLLED\_LIST.JOINT1 = B.WRITER\_NAME OR ENROLLED\_LIST.JOINT2 = B.WRITER\_NAME

조건을 넣어 공저자 책을 출력하게 해준다.

1. 각 고객에 대해 포인트 합을 출력하고, 성한 서평과 평점들을 출력(고객(id, 이름), 포인트 합, 구입서적(제목과 isbn 번호), 서평, 평점)
2. 테이블이(가) 표시된 사진

   자동 생성된 설명실행 화면

* 출력화면에서 알 수 있듯이 각 고객의 총 포인트 값과 책 이름에 대한 ISBN, 서평, 평점을 출력이 오류없이 일어났다.

1. 스크립트 출력

테이블이(가) 표시된 사진

자동 생성된 설명

1. 질의 코드

SELECT CUSTOMER\_NAME, CUSTOMER.CUSTOMER\_ID, POINT, BOOK\_NAME, BOOK.ISBN, EVALUATION, SCORE

FROM CUSTOMER, PURCHASE\_LIST, BOOK

WHERE CUSTOMER.CUSTOMER\_ID = PURCHASE\_LIST.CUSTOMER\_ID AND BOOK.ISBN = PURCHASE\_LIST.ISBN

ORDER BY CUSTOMER\_NAME

* 질의 코드는 복잡한 과정이 없다. 필요한 속성이 든 테이블을 FROM 절에 넣고, 고객 테이블과 구매 리스트 테이블의 ID가 같고, 여부와 책 테이블의 ISBN값과 구매 리스트 테이블의 ISBN이 같은 것을 조건으로 해주면 모든 조건을 만족하게 된다.

1. **개선점 및 마무리**
2. 본 과제를 작성하면서 테이블을 설계할 때에 비슷한 부류의 속성만으로 하나의 테이블을 작성한 사례가 있었다(주제(Genre) 테이블). 강의자료에도 존재하는 비슷한 사례이지만 생각해본 개선점은 다음과 같다.

* 각 주제별로 고유한 숫자를 부여해서 다른 주제의 숫자와의 차를 구했을 때 조건으로 지정한 범위 안쪽이라면 관련 주제로 보기

1. 과제 조건의 출판 날짜가 출판사 테이블이 보유해야 하는 값이 되면서 publication  
   \_date속성을 unique값으로 지정할 수 밖에 없었는데, publication\_date가 출판사 테이블에서 빠지고 책 테이블의 속성으로 들어갔더라면 각 책들이 서로 같은 출판일자를 가지는 것을 허용하게 되어 좀 더 real world와 가까운 DB를 구축할 수 있었을 것이다.

* 이상으로 데이터베이스 과제 5를 마친다.