COMP3005 - Look Inna Book Project

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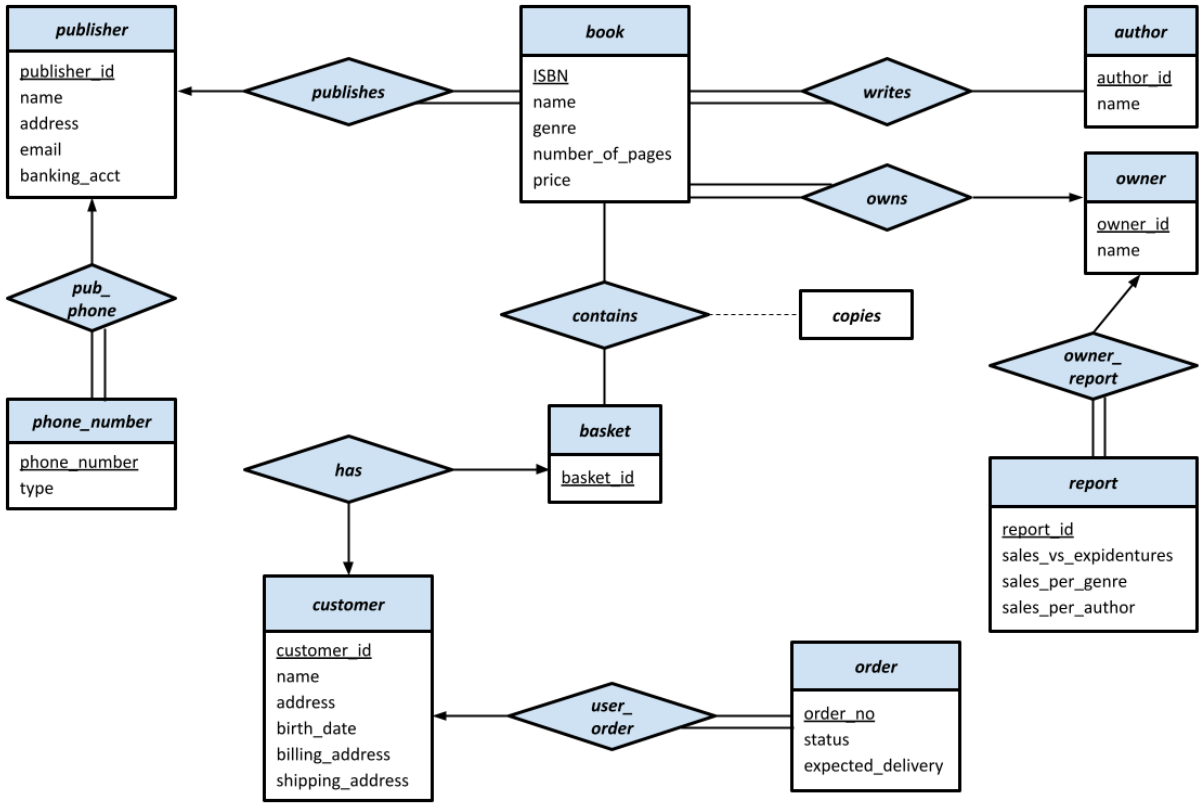
2.1 Conceptual Design (25%)



Assumptions:

- A book only has one publisher and a publisher can publish many books.
- A book can have many authors and an author can write many books.
- A book must be written by someone and published by someone.
- A book has one owner and an owner can have many books. A book must have an owner.
- An owner has many reports and a report has one owner. A report must have an owner.
- A basket can have many books and a book can only have many baskets (different customers).
- A customer only has one basket and a basket only has one customer.
- A customer can have many orders and an order only has one customer. An order must have one customer.
- All customers are already registered in the system.

- Billing and shipping information is not needed to register and can be added/saved when checking out.
- Database only manages books currently owned by an owner.

2.2 Reduction to Relational Schemas (15%)

publisher(publisher_id, name, address, email, banking_account)
book(ISBN, publisher_id, owner_id, name, genre, number_of_pages, price)
writes(author_id, ISBN)
author(author_id, name)
owner(owner_id, name)
report(report_id, owner_id, sales_vs_expidentures, sales_per_genre, sales_per_author)
basket(basket_id)
contains(basket_id, ISBN, copies)
has(customer_id, basket_id)
customer(customer_id, name, address, birth_date, billing_address, shipping_address)
order(customer_id, order_no, status, expected_delivery)
phone_number(publisher_id, phone_number, type)

2.3 Normalization of Relation Schemas (20%)

$pub\_ID \rightarrow pub\_name,\ pub\_address,\ email,\ banking\_acct,\ phone\_number$
$pub\_id,\ phone\_number \rightarrow type$
$ISBN \rightarrow pub\_ID,\ author\_ID,\ book\_name,\ genre$
$author\_ID \rightarrow author\_name,\ book\_name,\ genre,\ number\_of\_pages$
$owner\_ID \rightarrow owner\_name,\ price,\ report\_ID$
$owner\_ID,\ report\_ID \rightarrow sales\_vs\_expidentures,\ sales\_per\_genre,\ sales\_per\_author$
$customer\_ID \rightarrow cust\_name,\ cust\_address,\ birth\_date,\ billing\_address,\ shipping\_address,\ basket\_ID$
$customer\_ID,\ order\_no \rightarrow status,\ expected\_delivery$

<table>
<tr><td colspan="2">$R = \{ISBN\ (A),\ pub\_id\ (B),\ author\_id\ (C),\ book\_name\ (D),\ genre\ (E),\ number\_of\_pages\ (F),\ author\_name\ (G)\}$</td></tr>
<tr><td colspan="2">$F = \{A \rightarrow BCDE,\ C \rightarrow DEFG\}$</td></tr>
<tr><td>$Computing\ A^+$

$result = A$
$A \rightarrow BCDE$: $result = ABCDE$
$C \rightarrow DEFG$: $result = ABCDEFG = A^+$</td><td>$Computing\ C^+$

$result = C$
$C \rightarrow DEFG$: $result = CDEFG$
$A \rightarrow BCDE$: $result = CDEFG = C^+$</td></tr>
<tr><td colspan="2">R is not in BCNF because C is not a superkey.
$F_C = \{A \rightarrow BC,\ C \rightarrow DEFG\}$
Therefore, R can be decomposed into R_1(C,D,E,F,G) and R_2(A,B,C)
R_1 contains dependency $C \rightarrow DEFG$, therefore it is in BCNF.
R_2 contains dependency $A \rightarrow BC$, therefore it is in BCNF.

$R_1 \cap R_2 = \{C\}$
$C \rightarrow R_1$?
$C \rightarrow CDEFG$?

We know that $C \rightarrow C$ because C always determines itself and there already exists a functional dependency in F that says $C \rightarrow DEFG$. Therefore, we can conclude that this decomposition is lossless.</td></tr>
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$R = \{pub\_id\ (A),\ pub\_name\ (B),\ address\ (C),\ email\ (D),\ banking\_acct\ (E),\ phone\_number\ (F)$

$type\ (G)\}$
$F = \{A \rightarrow BCDEF,\ AF \rightarrow G\}$

$Computing\ A^+$ $result = A$ $A \rightarrow BCDEF$: $result\ = ABCDEF$ $AF \rightarrow G$: $result\ = ABCDEFG = A^+$	$Computing\ AF^+$ $result = AF$ $A \rightarrow BCDEF$: $result = ABCDEF$ $AF \rightarrow G$: $result\ = ABCDEFG = AF^+$
Therefore, R is in BCNF because A and AF are superkeys.	

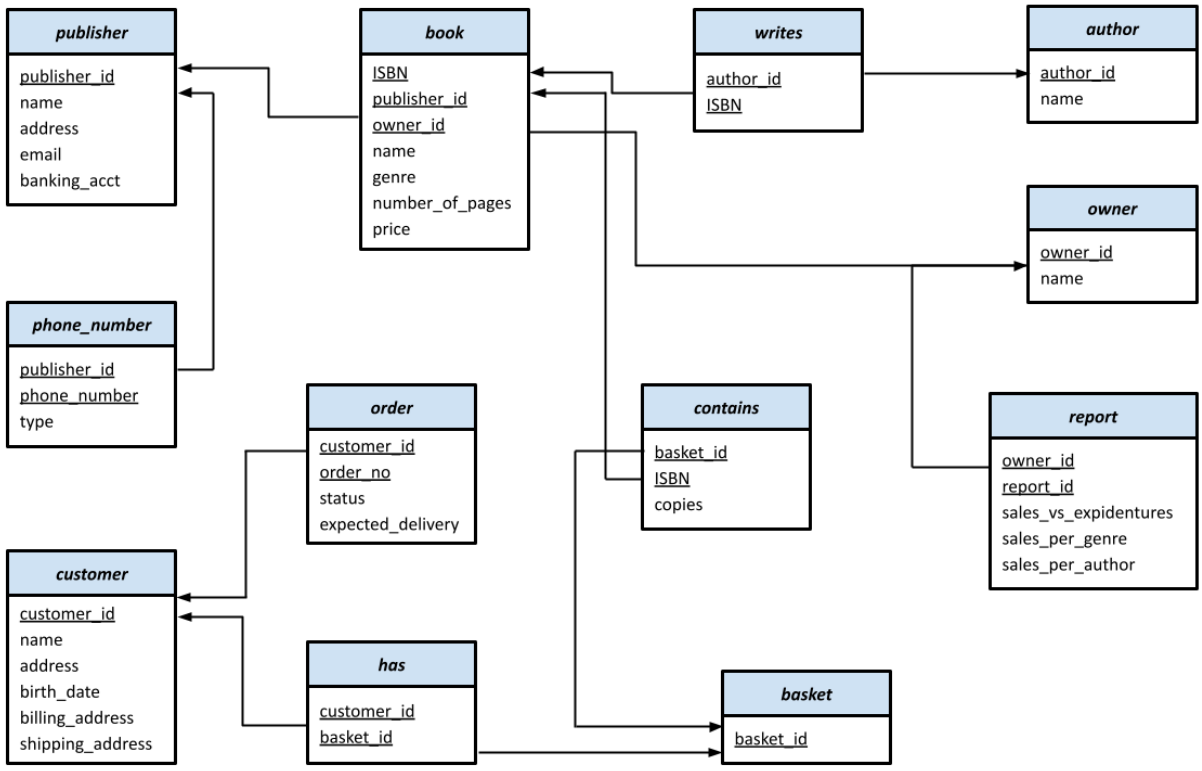
$R = \{owner\_id\ (A),\ owner\_name\ (B),\ report\_id\ (C),\ price\ (D),\ sales\_vs\_expidentures\ (E),$ $sales\_per\_genre\ (F),\ sales\_per\_author\ (G)\}$
$F = \{A \rightarrow BCD,\ AC \rightarrow EFG\}$

$Computing\ A^+$ $result = A$ $A \rightarrow BCD$: $result\ = ABCD$ $AC \rightarrow EFG$: $result\ = ABCDEFG = A^+$	$Computing\ AC^+$ $result = AC$ $A \rightarrow BCD$: $result = ABCD$ $AC \rightarrow EFG$: $result\ = ABCDEFG = AC^+$
Therefore, R is in BCNF because A and AC are superkeys.	

$R = \{cust\_id\ (A),\ cust\_name\ (B),\ cust\_address\ (C),\ birth\_date\ (D),\ billing\_address\ (E),$ $shipping\_address\ (F),\ basket\_id\ (G),\ order\_no\ (H),\ status\ (I),\ expected\_delivery\ (J)\}$
$F = \{A \rightarrow BCDEFGH,\ AH \rightarrow IJ\}$

$Computing\ A^+$ $result = A$ $A \rightarrow BCDEFGH$: $result\ = ABCDEFGH$ $AH \rightarrow IJ$: $result\ = ABCDEFGHIJ = A^+$	$Computing\ AH^+$ $result = AH$ $A \rightarrow BCDEFGH$: $result = ABCDEFGH$ $AH \rightarrow IJ$: $result\ = ABCDEFGHIJ = AH^+$
Therefore, R is in BCNF because A and AH are superkeys.	

2.4 Database Schema Diagram (10%)



2.5 Implementation (30%)

Due to exams for other courses and responsibilities, I was not able to complete the implementation portion of the project. I have created a DDL and Insertions file for my database and have added all my diagrams to the GitHub repository.

2.7 GitHub Repository

Link: https://github.com/krishmathi/Look-Inna-Book

2.8 Appendix

I am available to demo anytime after 12 PM on December 20th.