

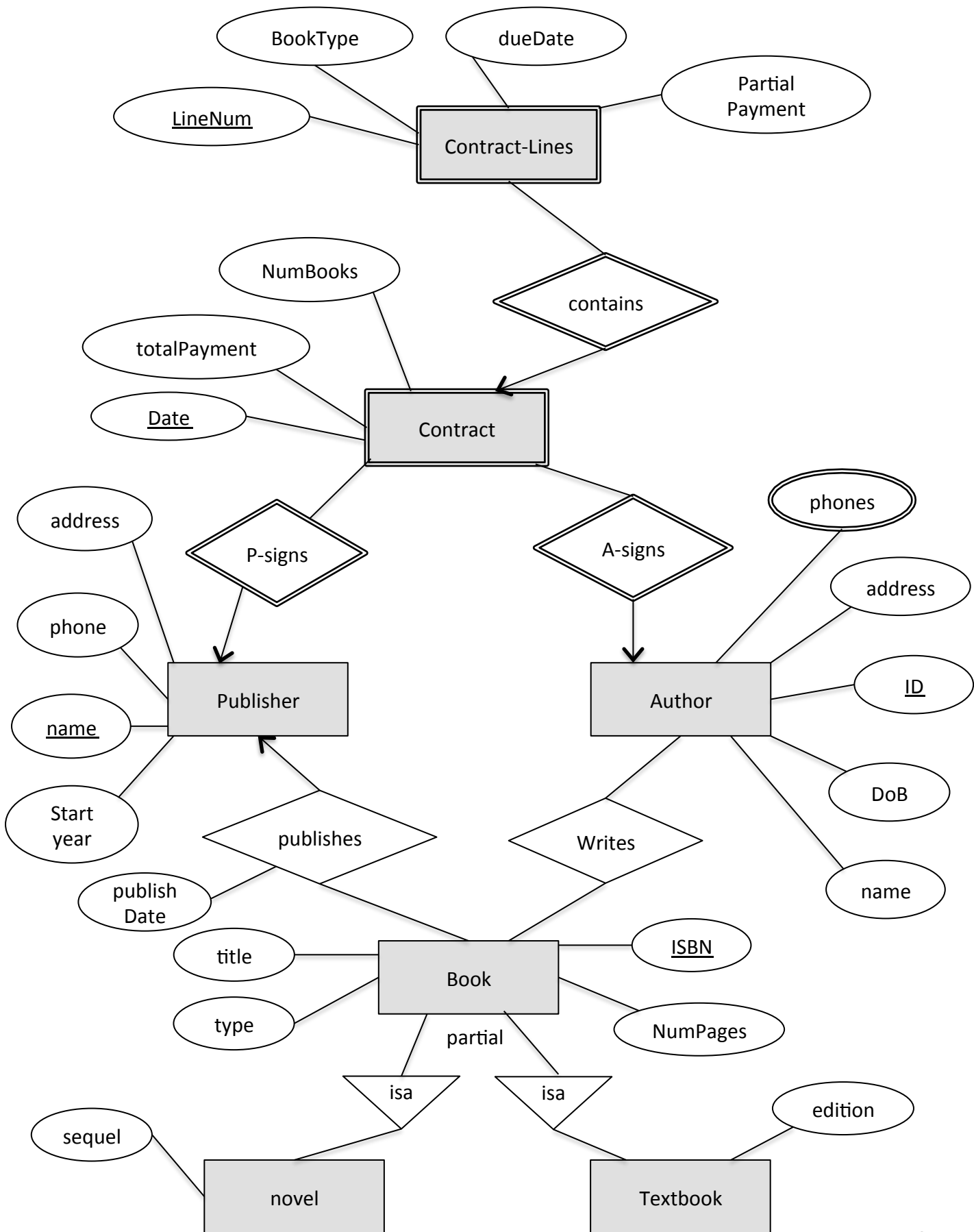
Database Systems I
CS3431
B-2011

Solution of Homework 1

Problem 1

Design Assumptions

- A book must have a publisher defined. That is, each book must have one and only one publisher.
- A book publishing date can be either attached to the relationship “publishes” or to the “book” entity set. This is because the relationship must exist for each book.
- A contract must have one author and one publisher
- A contract is considered a weak entity set since it does not have a primary key on its own. A “date” attribute is added to the contract entity set, such that the three attributes (author ID, publisher Name, and the contract date) will together form the primary key of the contract weak entity set.
- The “date” attribute in the “contract” entity set is considered as “discriminator” attribute.
- The contract details are stored in “Contract-Lines” entity set, where each line contains the due date of a given book to be delivered by the author. Each line also specifies the book type, and the partial payment to be paid by the publisher.
- A discriminator attribute “LineNum” is added to the “Contract-Lines” such that this entity set becomes a weak entity set and “Contract” entity set becomes its identifying entity set.
- The primary key of “Contract-Lines” will be (author ID, publisher Name, contract date, and LineNum).
- The ISA relationship for “Book” entity set is marked as “partial” indicating that a book may be neither a novel nor a textbook.
- Business constraints that cannot be modeled in the ERD include:
 - The number of lines in any contract must match the value in “NumBooks” in the contract.
 - The sum of the partial payments in the contract lines must match the total payment defined in the contract.



Problem 2

Design Assumptions

- In the new ERD diagram, we will extend/modify only the “Author” and “Book” entity sets. And introduce the “customer” entity set.
- All the other entity sets and relationships will remain the same, therefore, they will be taken out from the new diagram.
- The many-to-many relationship between “Author” and “Book” (“writes” relationship) will be taken out and replaced with a new entity set “Author-book”. The main reason for this change is that we need this new entity set to build a relationship with the “customer” entity set.
- The “Author-book” is a weak entity set with the primary key as (AuthorID, bookISBN)
- Since a customer may buy the same book multiple times, a new attribute called “numCopies” is added to the relationship “onlinePurchase”. If you assume that a single transaction will contain only one copy of a given book, then you do not need this attribute.
- The “date” attribute in relationship “onlinePurchase” will be part of the key indicating that a customer may buy the same book ISBN multiple times on multiple dates.
- The relationship “giftCopy” indicates that a customer may get many gift copies while a given (book, author) pair can be given as a gift up to 50 times.
- None of the attributes of “giftCopy”, i.e., “comment” or “date”, is part of the key. This indicates that a given customer may get a gift copy of a certain book from a certain author at most once.

