# COSC265 Tutorial 2 Solutions

1. Specialization is needed in two cases:
   a. If there are several groups of entities, which have some specific attributes that are not relevant for all the entities;
   b. If there are some relationship types that involve only some of the entities (or, there are different roles played by entities that belong to the same entity type).

2. A user-defined specialization requires that the user specifies the subclass for each entity that belongs to the superclass. In the case of an attribute-defined specialization, the DBMS can automatically decide which subclass an entity belongs to, based on the value of the defining attribute. A predicate-defined specialization is similar to the attribute-defined one, but the condition may involve several attributes. In other words, the condition is not a simple comparison as in the case of the attribute-defined specialization, but may be a compound condition involving several attributes and their values.

3. In a subclass hierarchy, every entity type has at most one superclass. In the case of a lattice, there might be shared subclasses, which have two or more superclasses.

4. The first diagram illustrates a disjoint specialization, with four subclasses. In the second case, there are three specializations: the first is a disjoint specialization with two subclasses (EA and EB), the second specialization has just one subclass (EC), as is the case with the third one. In the latter case, the three specializations have nothing in common --- they may be defined using completely different attributes. Therefore, the semantics of the domain must be considered to see whether the entities of E1 can be classified according to one or more criteria.

5. Completed diagram:
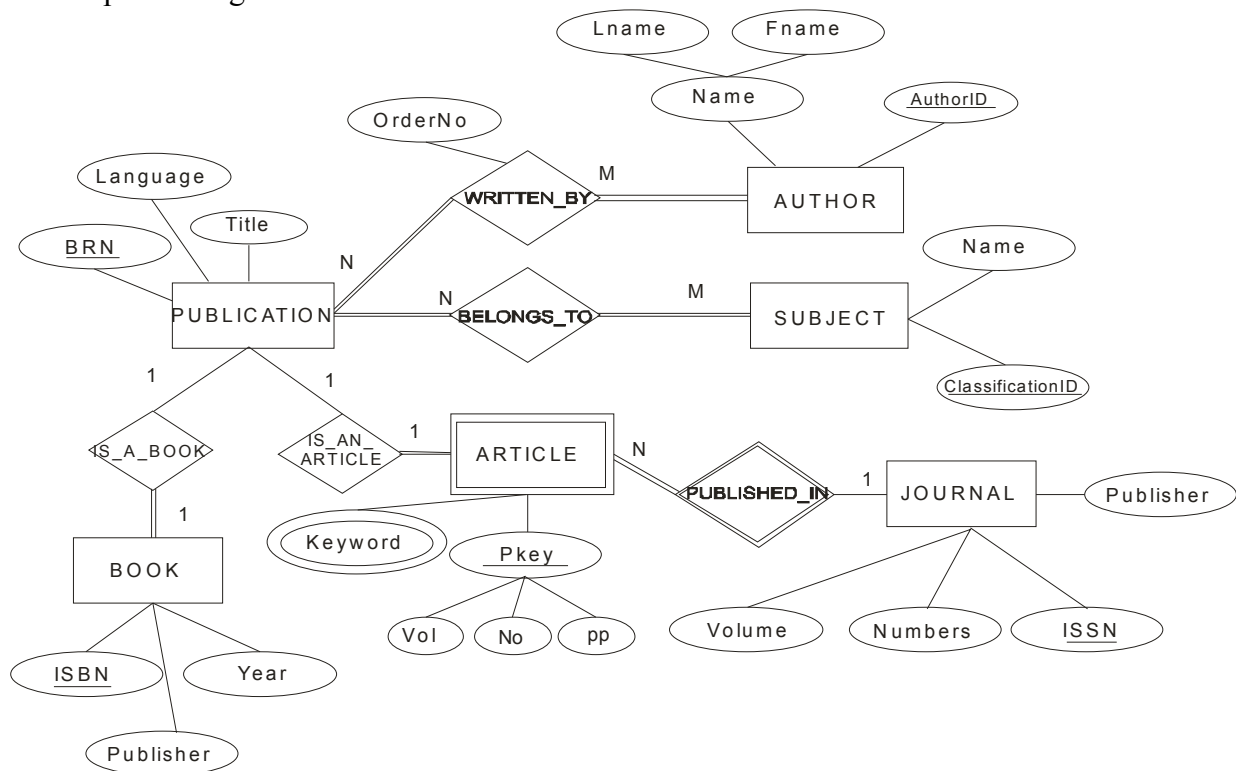
The corresponding relational schema:

PUBLICATION (<u>BRN</u>, TITLE, LANGUAGE)
BOOK (<u>ISBN</u>, YEAR, PUBLISHER, BRN)
ARTICLE (<u>ISSN, VOL, NO, PAGES</u>, BRN)
AUTHOR (<u>ID</u>, LNAME, FNAME)
SUBJECT (<u>CLASSID</u>, NAME)
JOURNAL (<u>ISSN</u>, VOLS, NUMBERS, PUBLISHER)
KEYWORD (<u>ISSN, VOL, NO, PAGES, KEYWORD</u>)
WRITTEN_BY (<u>BRN, AUTHOR</u>, ORDER)
BELONGS_TO (<u>BRN, SUBJECT</u>)

6. The binary relationship between PUBLISHER and PUBLISHER_EMPLOYEE (HAS) should have total participation on both sides, and the cardinality ratio should be 1:N.

PUBLISHER participates partially in the relationships with BOOK and JOURNAL, while these two entity types participate totally. The cardinality is the same in both cases (1:N).

The relationship CONTAINS between JOURNAL and ARTICLE: both participations are total, and cardinality is 1:N.

The relationship ARTICLE_REVIEWED_BY between ARTICLE and ARTICLE_REVIEWER: ARTICLE participates totally, and the other entity type participates partially. The cardinality is M:N.

The relationship ARTICLE_WRITTEN_BY between ARTICLE and ARTICLE_AUTHOR: both entity types participate totally. The cardinality is M:N.

The specialization of AUTHOR into BOOK_AUTHOR and ARTICLE_AUTHOR is total and overlapping.

The specialization of PUBLISHER_EMPLOYEE into BOOK_AUTHOR and BOOK_REVIEWER is total and overlapping.

The relationship BOOK_REVIEWED_BY between BOOK and BOOK_REVIEWER: both entity types participate totally. The cardinality is M:N.

The relationship BOOK_WRITTEN_BY between BOOK and BOOK_AUTHOR: both entity types participate totally. The cardinality is M:N.

The specialization of INDEPENDENT_PROFESSIONAL into ARTICLE_AUTHOR and ARTICLE_REVIEWER is total and overlapping.

The specialization of REVIEWER into ARTICLE_REVIEWER and BOOK_REVIEWER is total and disjoint.