Relational Databases

INFO6540

Week 7 - Feb 27, 2018

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Questions?

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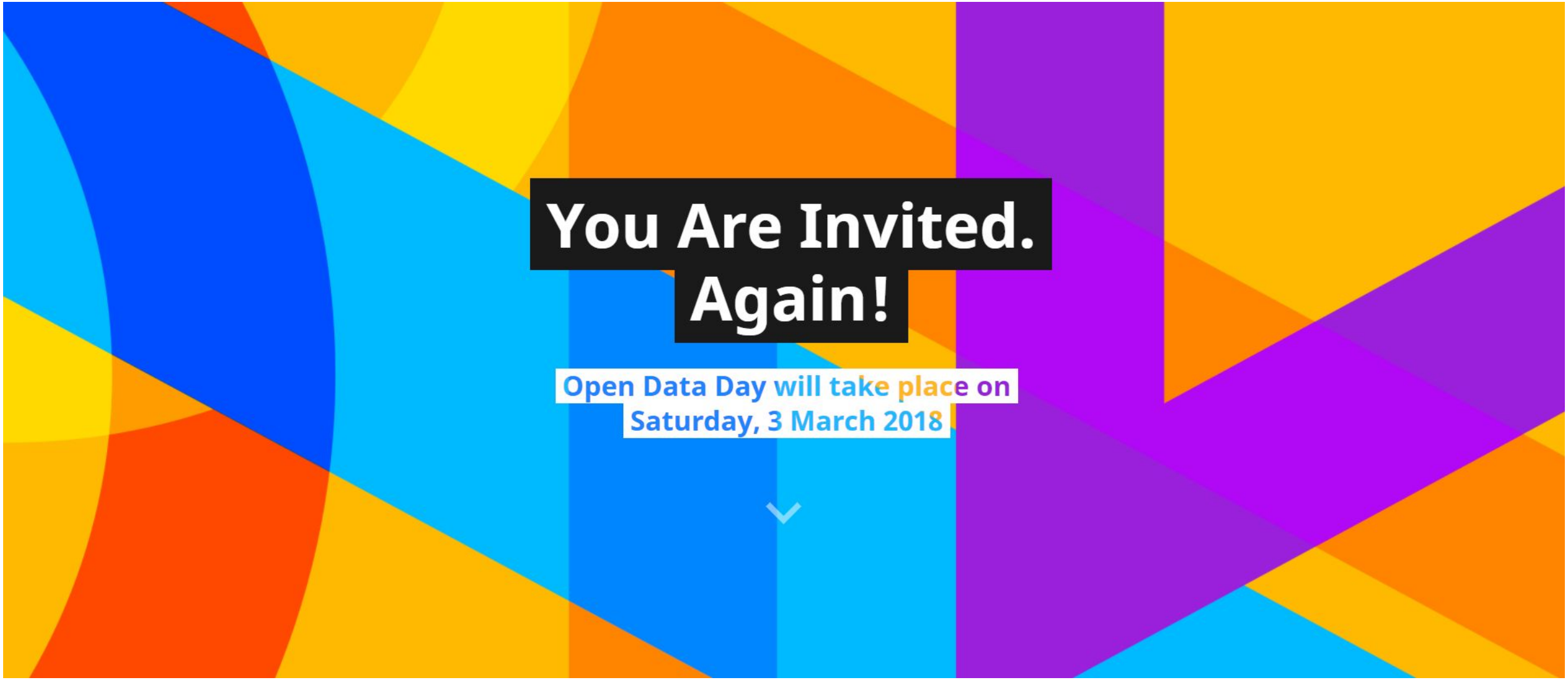

http://opendataday.org/

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Data Nova Scotia

[Nova Scotia Government's Open Data Portal]

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Week 4

- Ontologies
  - Triples
  - Entities
  - Object Properties
  - Knowledge graphs

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DMP Tool

[Data Management Planning tool (https://dmptool.org/)](https://dmptool.org/)

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Group project

Number of students: 48

Number of group members: 4

Build your own groups!

I will only interfere if there are any issues.

Send me the names of the group members by March 13

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Standards

https://www.cablestogo.com

http://laptops.reviewed.com/

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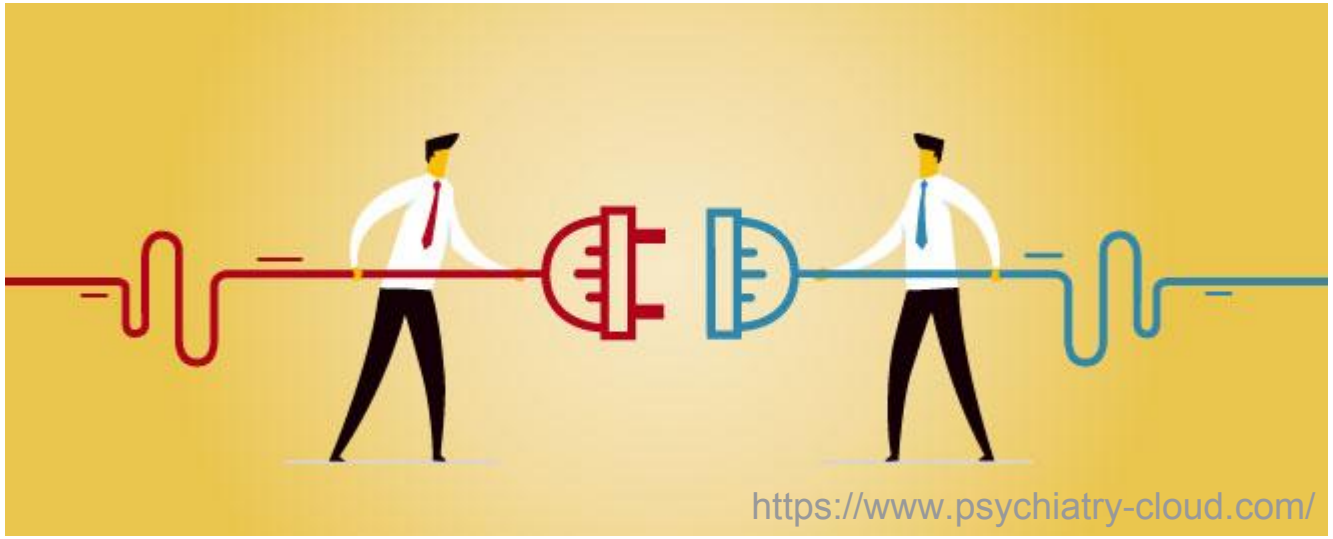
Standards

What are they? Why do we need them?

Interoperability



Data Standards

JSON

{
“author”: {“given_name”: “Elvira”, “family_name”: “Mitraka”},

“title”: “Paratransgenesis and ontology driven informatic tools: two different approaches to fight mosquito-borne diseases”,

“date_of_final_accept”: “2014-06-17”
}

Data Standards

CSV

author_given_name, author_family_name, title, date_of_final_accept

Elvira, Mitraka, Paratransgenesis and ontology driven informatic tools: two different approaches to fight mosquito-borne diseases, 2014-06-17

Data Standards

XML

```
<thesis>

 <author>
   <given_name>Elvira</given_name>
   <family_name>Mitraka</family_name>
 </author>

 <title>Paratransgenesis and ontology driven informatic tools: two different approaches to fight mosquito-borne
  diseases</title>
 <date_of_final_accept>2016-06-17</date_of_final_accept>

</thesis>
```

Data Standards

ISBN

International Standard Book Number is an internationally regulated system of identifying books by number. Publishers purchase a bunch of ISBNs at one time and then assign them to publications.

ISSN

International Standard Serial Number is a government regulated system of identifying serials (journals) by number. All issues of the same journal will have the same ISSN unless the journal title has changed.

DOI

Digital Object Identifiers help identify specific journal articles. These are frequently used for scientific articles.

PMID

PubMed IDs are strings of numbers that identify records in the PubMed database

ORCID

Open Researcher and Contributor ID is a nonproprietary alphanumeric code to uniquely identify scientific and other academic authors and contributors.

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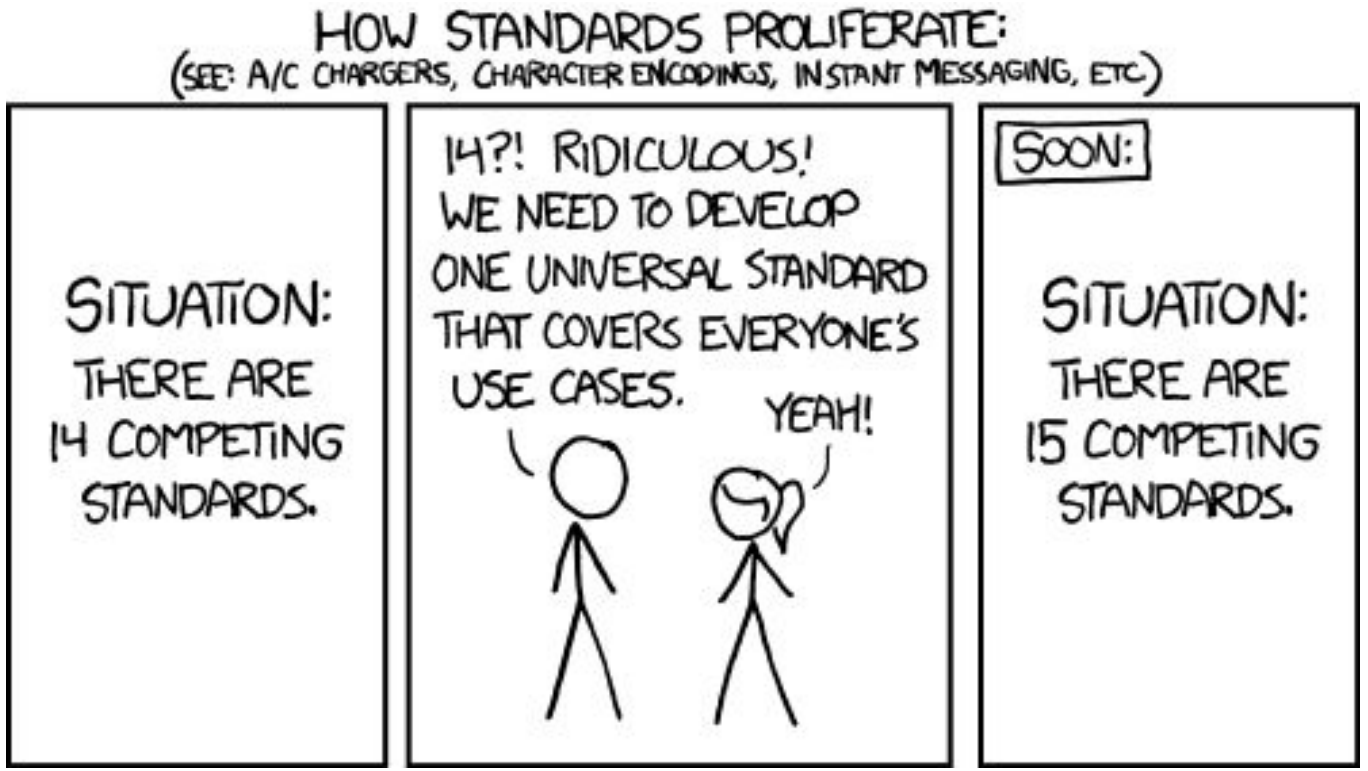
Data Standards



https://xkcd.com/927/

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Relational databases (RDB)

- Go-to application for data storage
- Data modelling helps in understanding data
- Data modelling helps in managing data

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Relational database management system (RDBMS)

- Structure
- Consistency
- Integrity
- Efficiency
- Types
- Performance
- Easy to CRUD:
  - Create, update, delete

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What an RDBMS gets from us

- Structure
  - Tables and relationships
- Some standards
  - Every row in any given table is unique
- Relational information
  - Cells in one table can reference rows of another table
- Data of appropriate type

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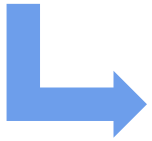
Data modelling

Going from raw data to an RDBMS-compatible data schema



Defining the structure of your data

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Entity-Relationship modelling

http://bourdagechiropractic.com/

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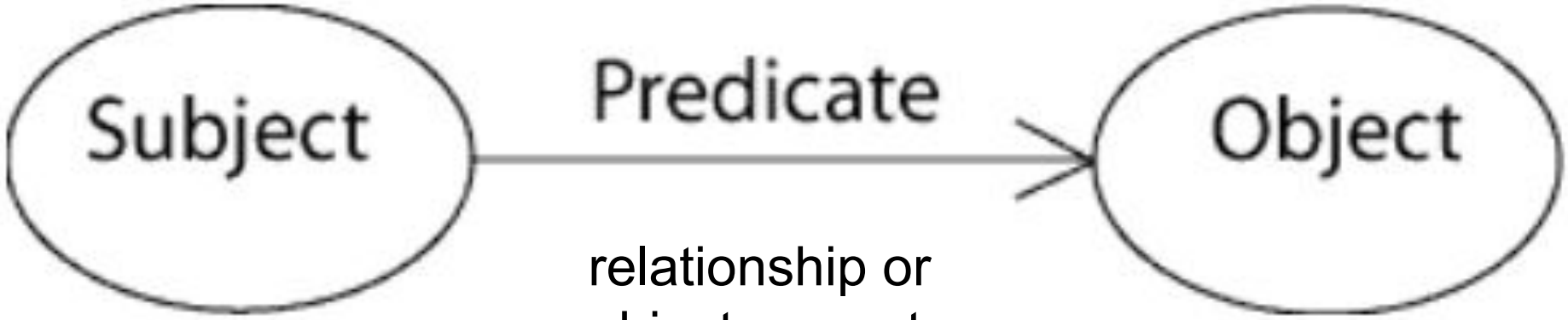
Graph data model

Stephen King hasPseudonym Richard Bachman



relationship or
object property

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Entities

Represent the world: things, structures, objects - e.g. people, places, items

Entity

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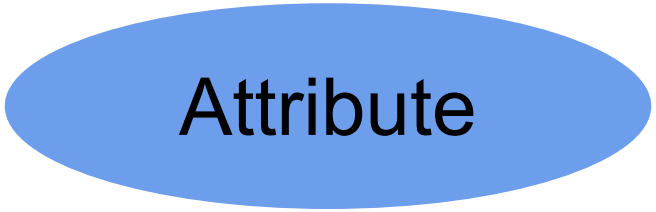
Attributes

Characteristics of entities

Can be optional



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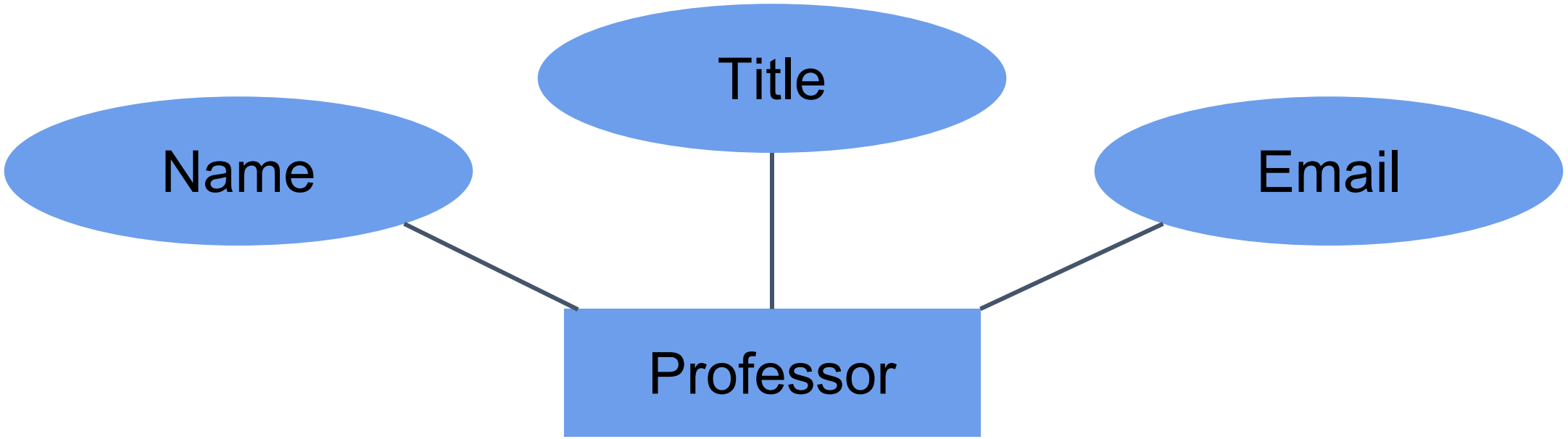
Entity and Attributes



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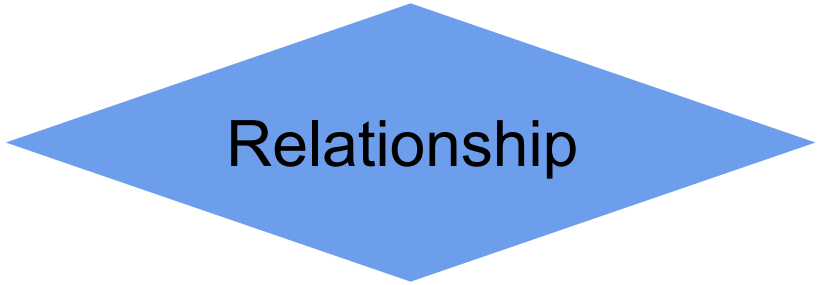
Relationships

How entities are related.



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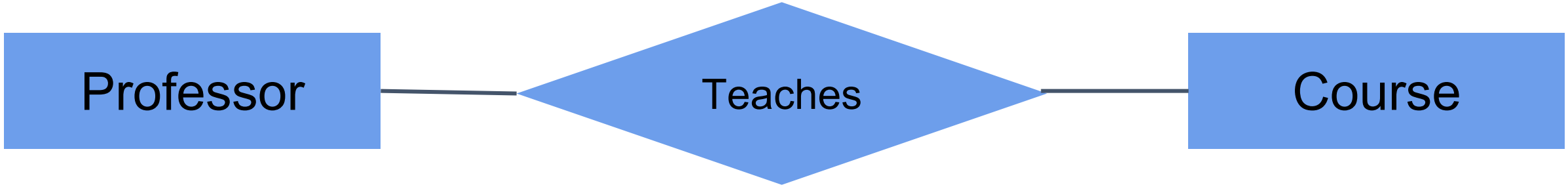
Entity-Relationship modelling



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Cardinality (data modelling)

How one table relates to another

One-to-One: One row in table A relates to one row in table B

One-to-Many: One row in table A relates to many rows in table B

Many-to-Many: Many rows in table A relate to many rows in table B

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Maximum cardinality

Many: 

One: 

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Minimum cardinality (optional or mandatory)

Mandatory many: 

Optional many: 

Mandatory one: 

Optional one: 

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Minimum cardinality (optional or mandatory)

At least one. One or more:

Zero or more:

One and only one:

Zero or one:

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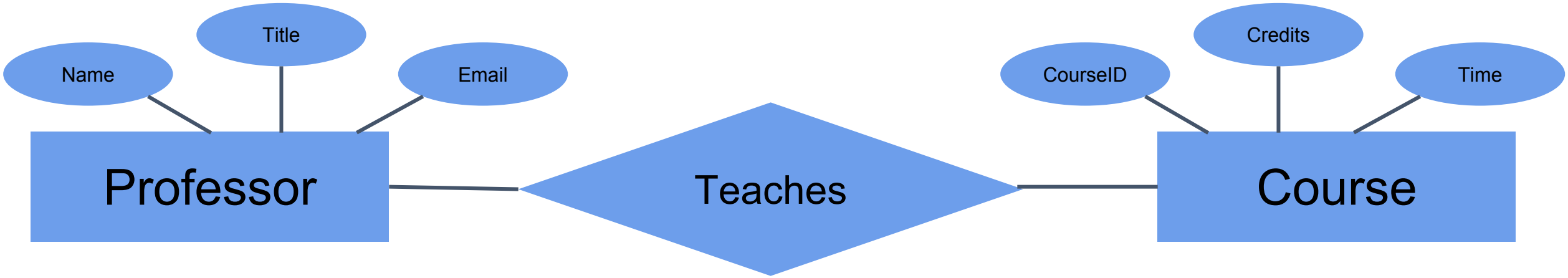
Entity-Relationship modelling



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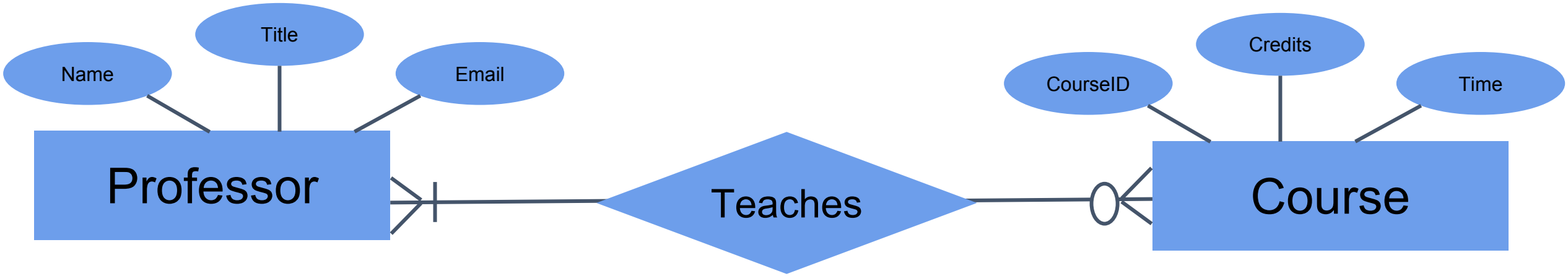
Entity-Relationship modelling



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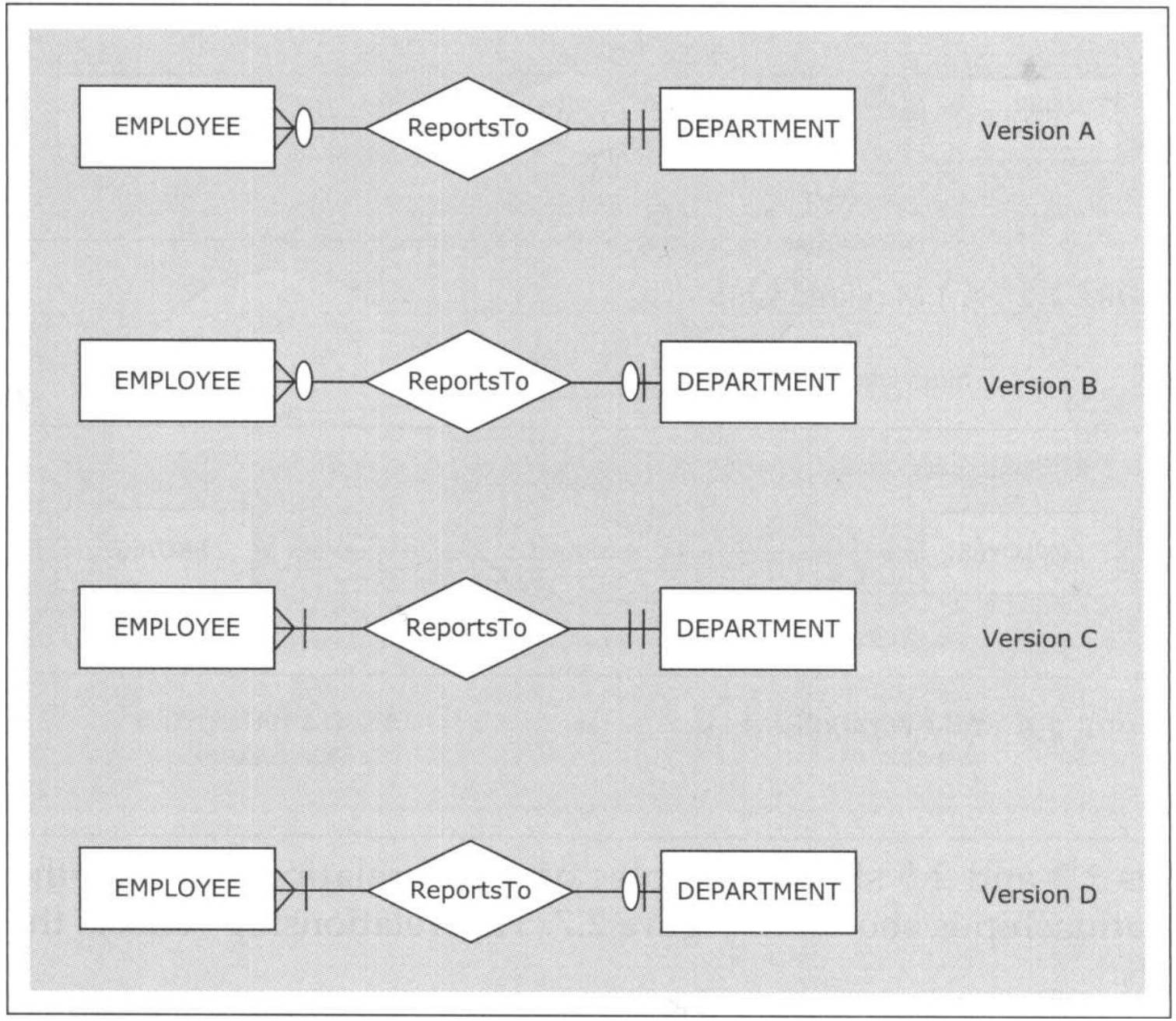

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Version A: Each employee reports to exactly one department. A department may have many employees reporting to it, but it does not have to have any.

Version B: An employee can report to one department or to no departments at all. A department may have many employees reporting to it, but it does not have to have any.

Version C: Each employee reports to exactly one department. A department must have at least one employee reporting to it, but it may have many employees reporting to it.

Version D: An employee can report to one department or to no departments at all. A department must have at least one employee reporting to it, but it may have many employees reporting to it.

- LIBRARY_ITEM
  - Item_ID
  - Title
  - Category

    - BOOK
      - ISBN
      - Author
      - Available_Status
    - MAGAZINE
      - Issue_Date
    - JOURNAL
      - Volume
      - Number

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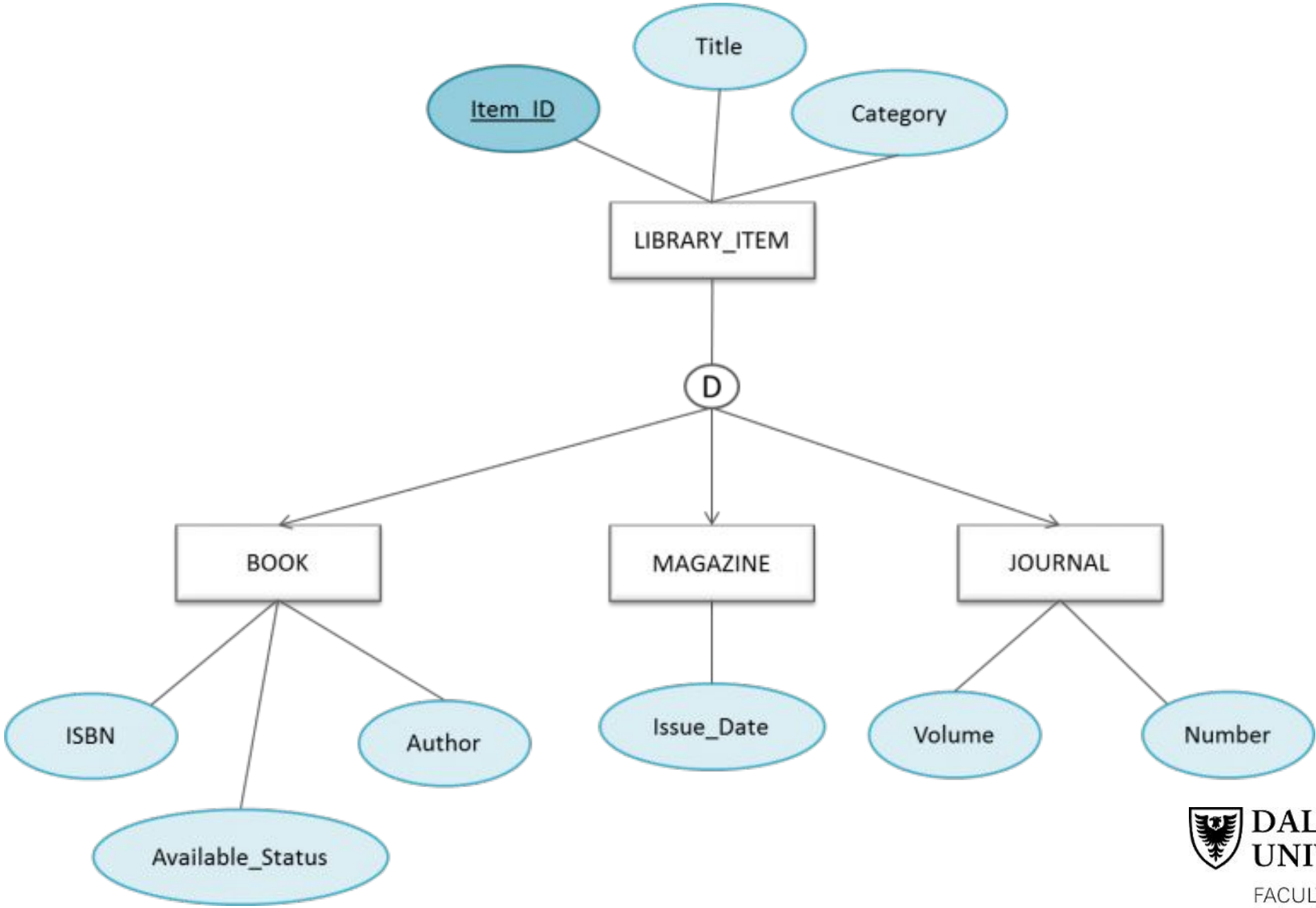

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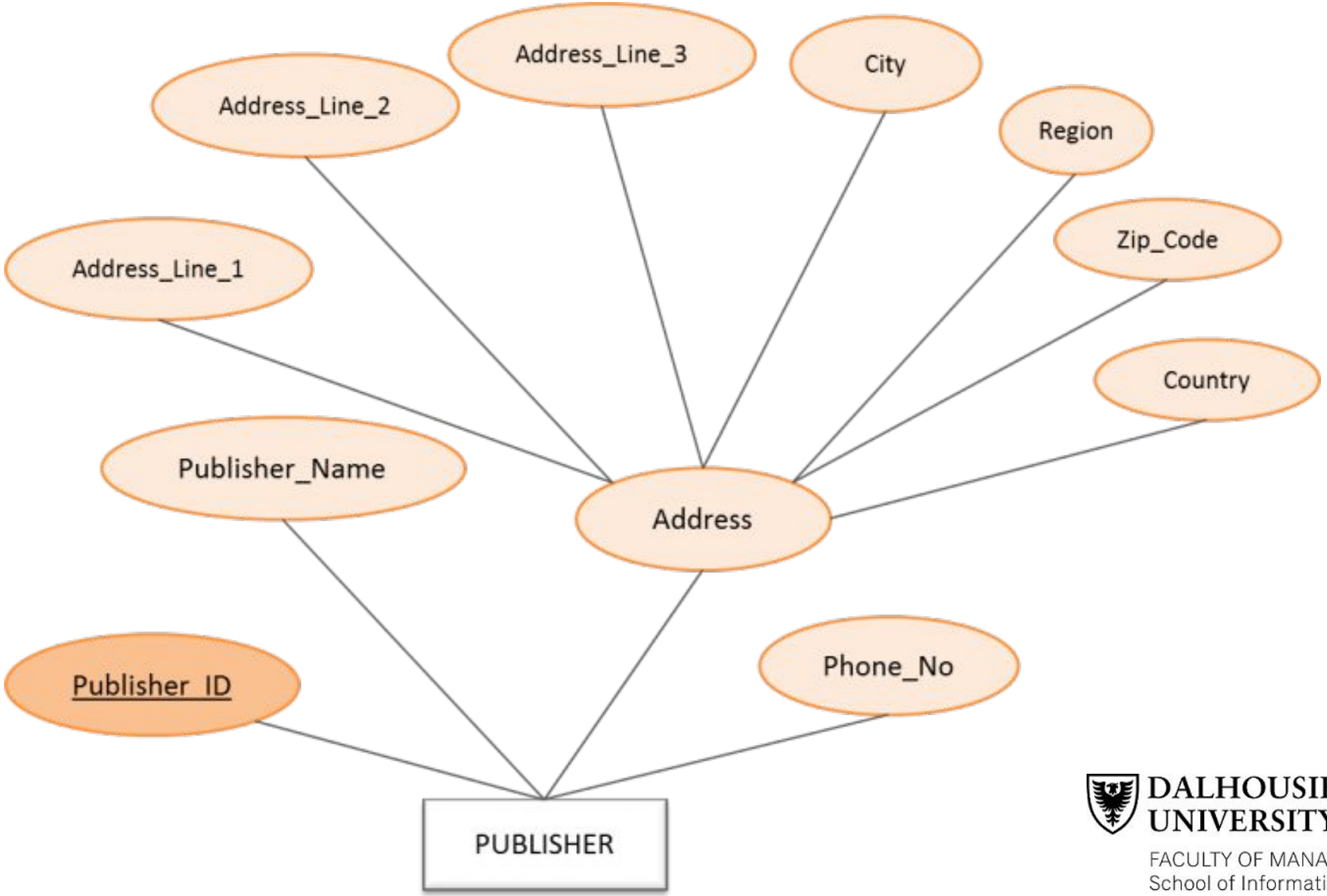
- PUBLISHER
  - Publisher_ID
  - Publisher_Name
  - Phone_No
  - Address
    - Address_Line_1
    - Address_Line_2
    - Address_Line_3
    - City
    - Region
    - Zip_Code
    - Country



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- BORROWER
  - Borrower_ID
  - Name
  - Membership_Type
  - Membership_Date
  - Expiry_Date
  - Phone_No
    - Mobile_No
    - Home_No
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    - Address_Line_1
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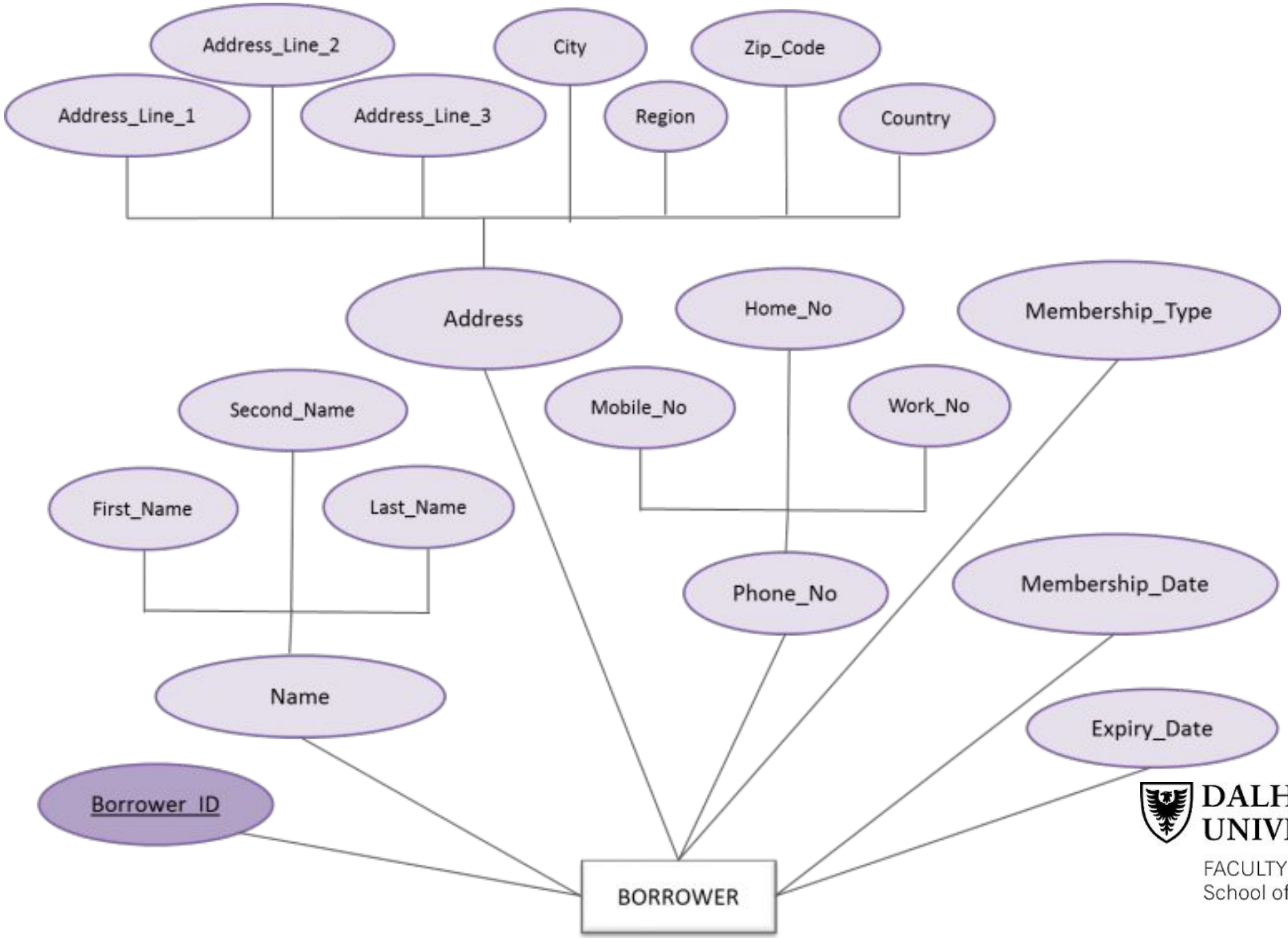
    - City
    - Region
    - Zip_Code
    - Country



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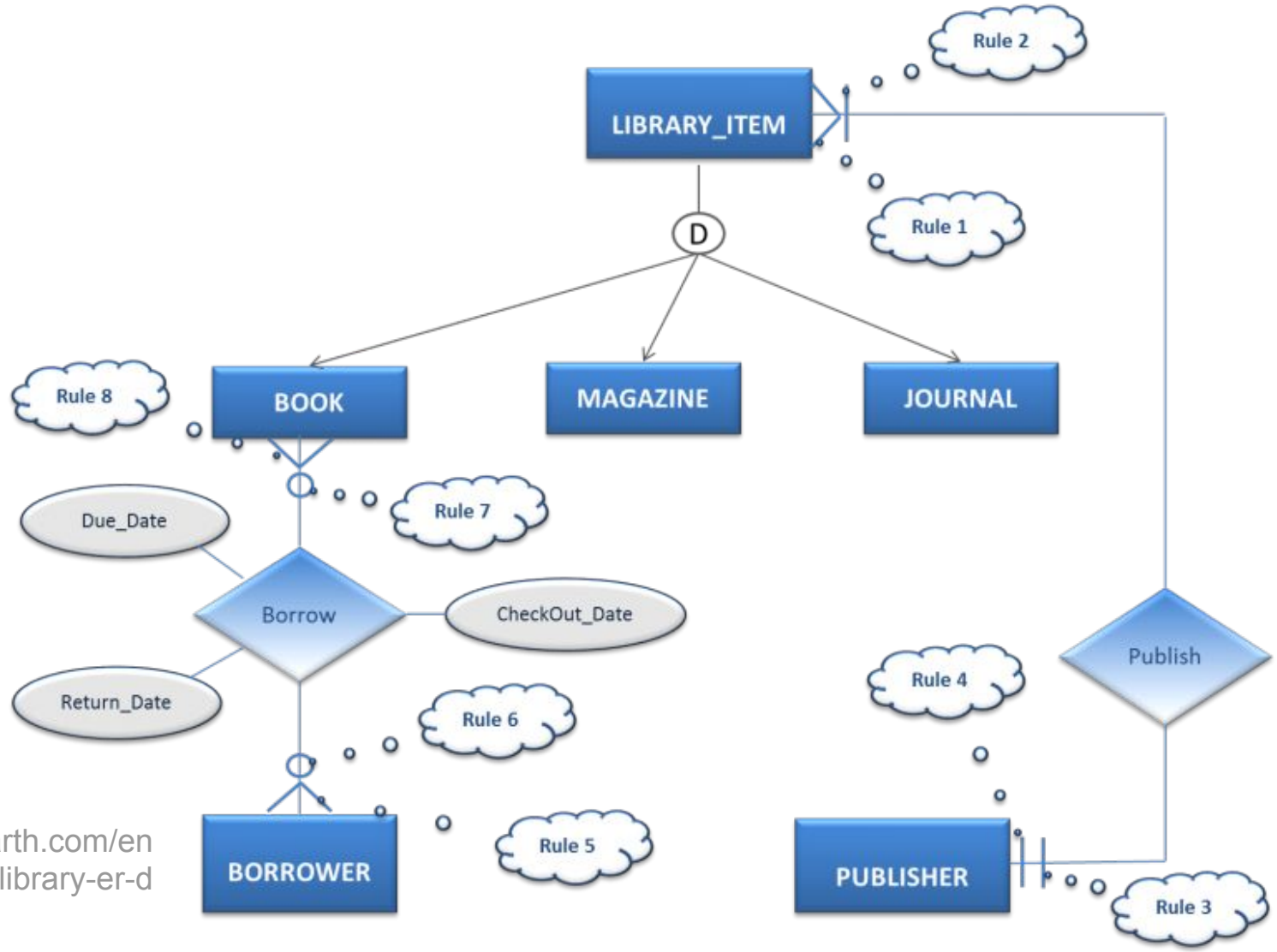
Library ER diagram



http://www.analyticsonearth.com/entity-relationship-diagram/library-er-diagram/

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Library ER diagram

Rule 1: A publisher can publish more than one library item. This is denoted by three lines.

Rule 2: A publisher must publish a library item. This is denoted by 1 (one) sign. This rule depends on your design. There is no need to keep publisher information if the publisher had no library items.

Rule 3: A library item must belong to a publisher. This is denoted by 1 (one) sign.

Rule 4: A library item belongs to only one publisher. This is denoted by 1 (one) sign.

Rule 5: A book can be borrowed by more than one person. This is denoted by three lines. Note that, there is a checkout attribute and available status attribute. If these two attributes do not exist, then this rule will not be valid. A book cannot be borrowed by different people at the same time.

Rule 6: A book does not have to be borrowed by a person. This is denoted by 0 (zero) sign.

Rule 7: A person does not have to borrow a book. This is denoted by 0 (zero) sign.

Rule 8: A person can borrow more than one book. This is denoted by three lines.

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http://www.gliffy.com

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