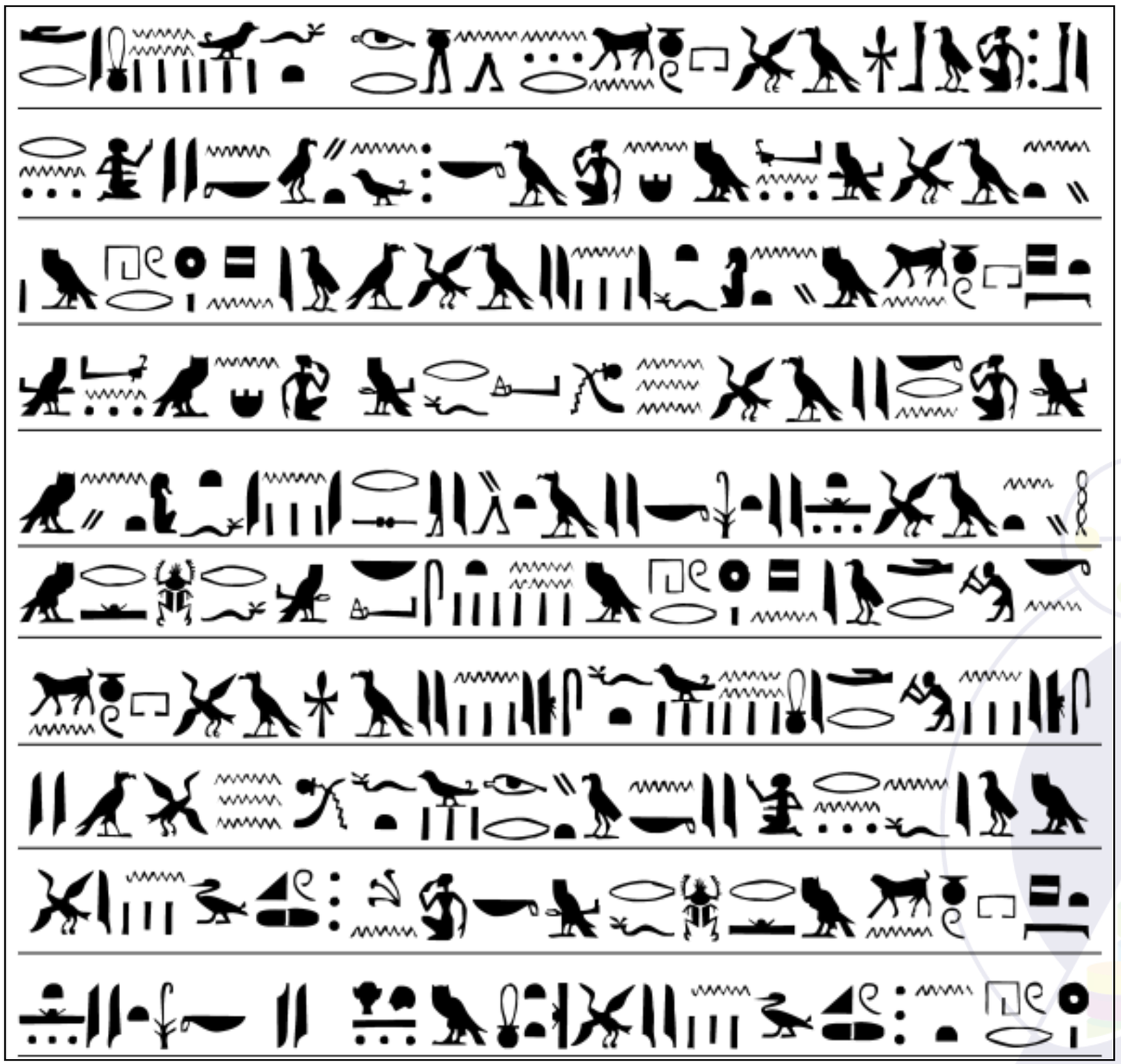
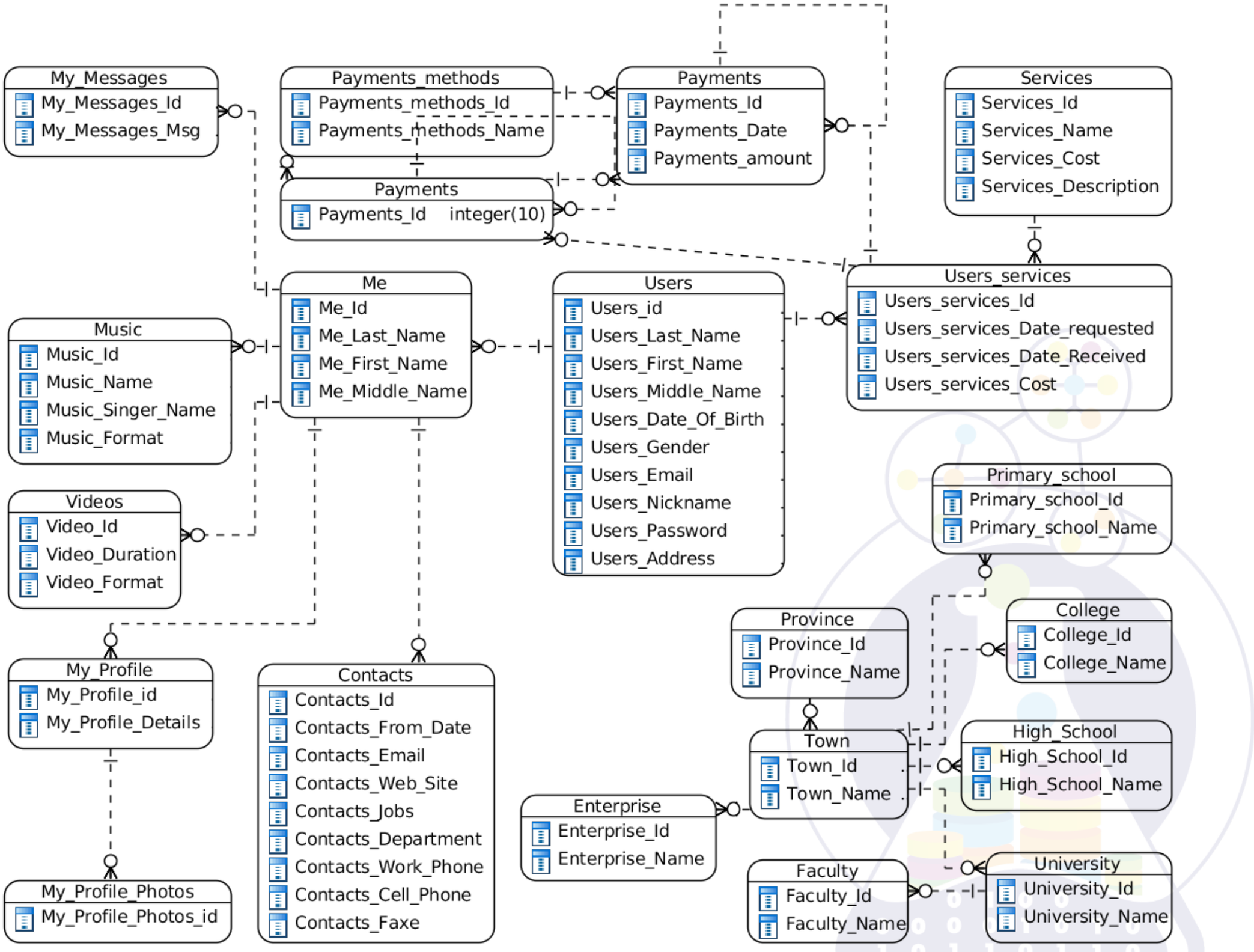
datalab

data is everywhere, value is hidden

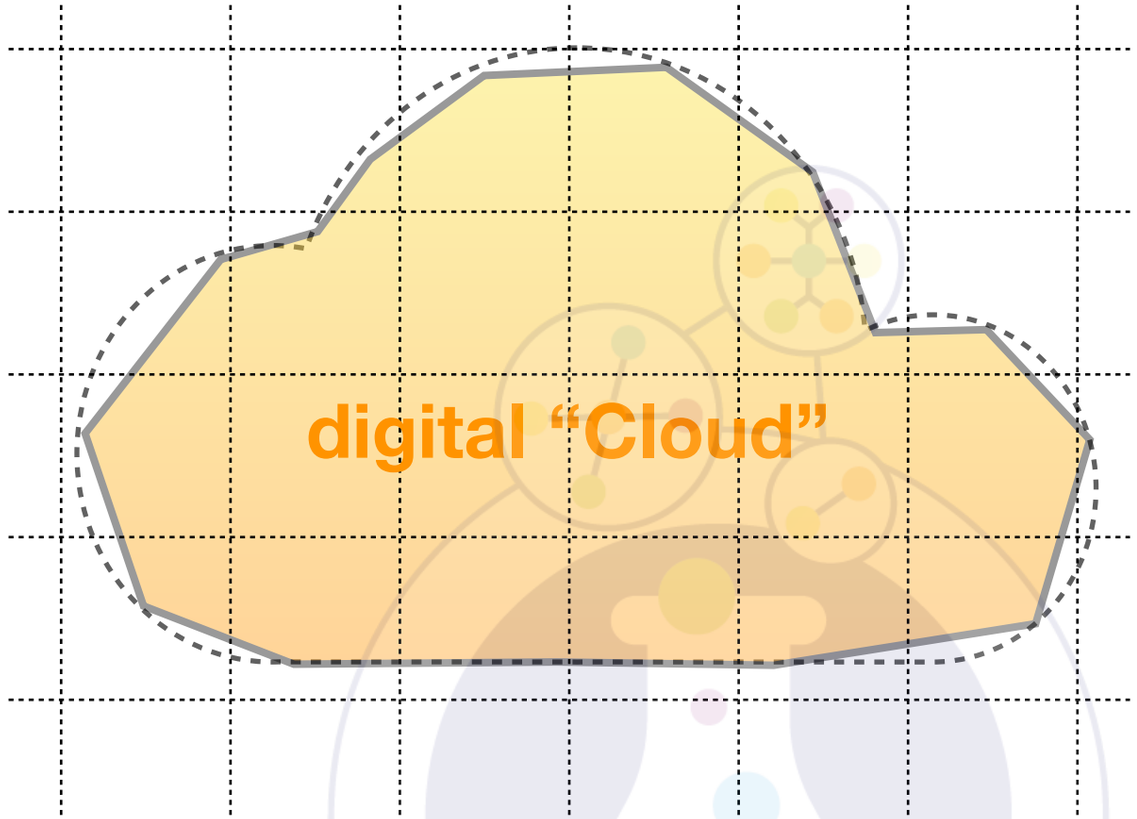
Relational Databases

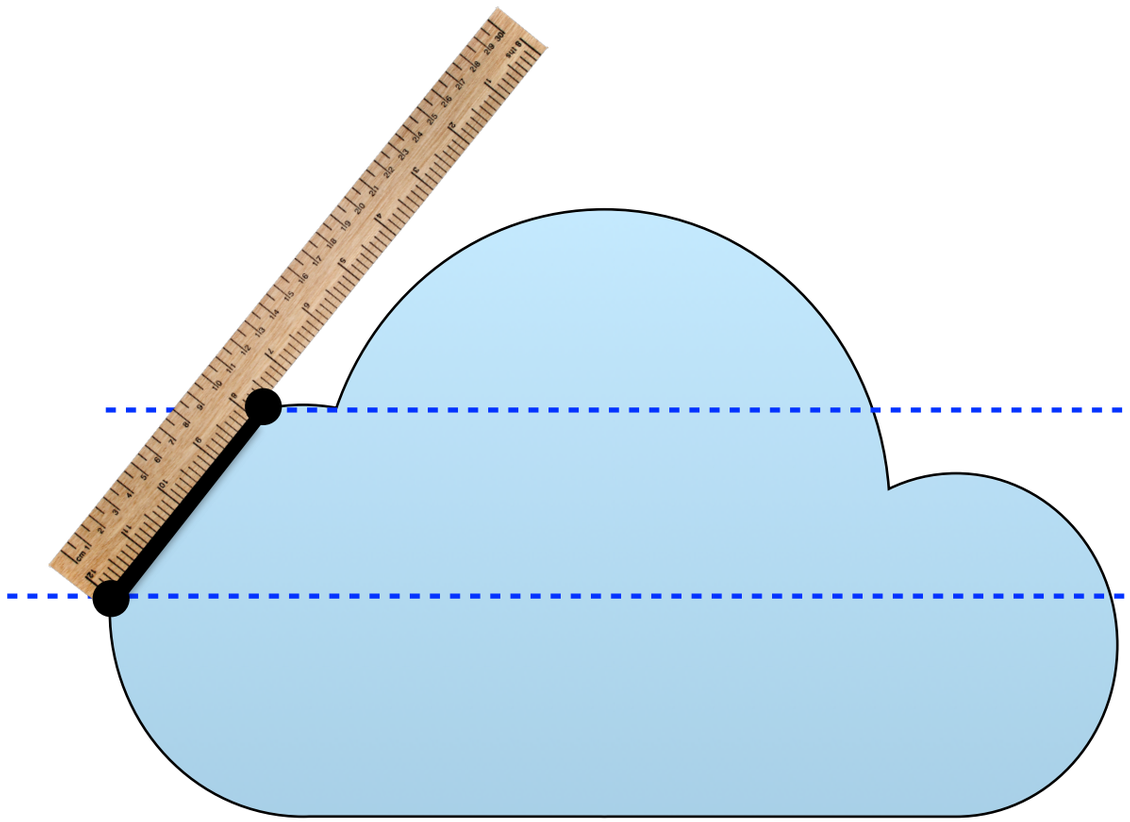
Lecturer: Азат Якупов (Azat Yakupov)
https://datalaboratory.one

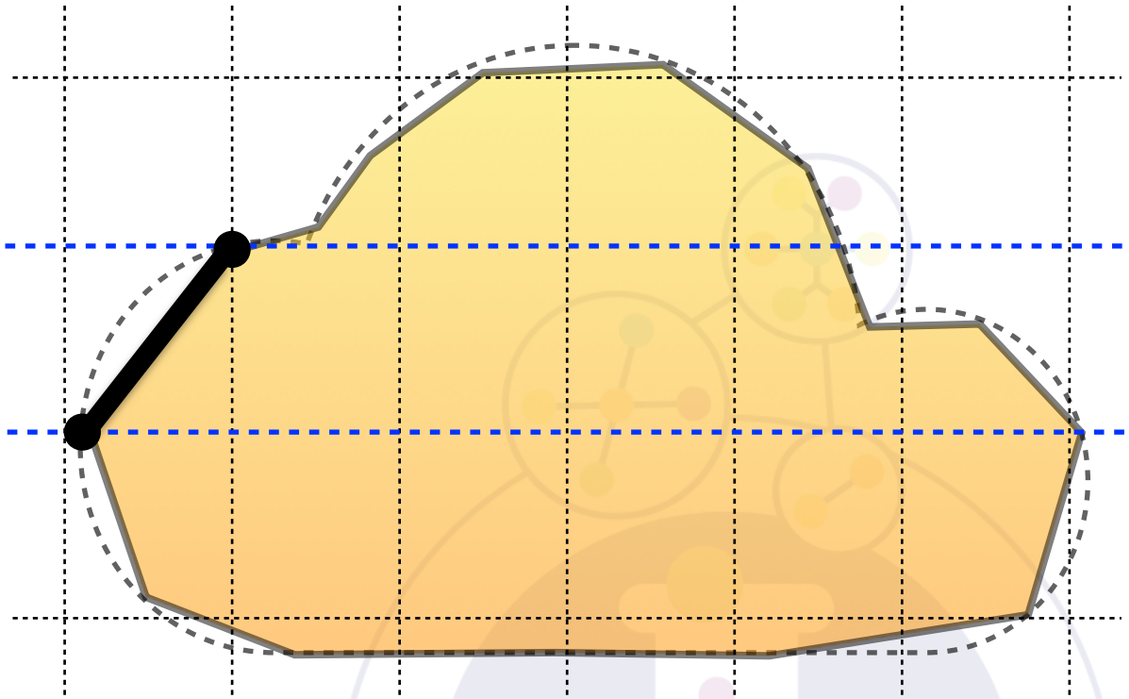


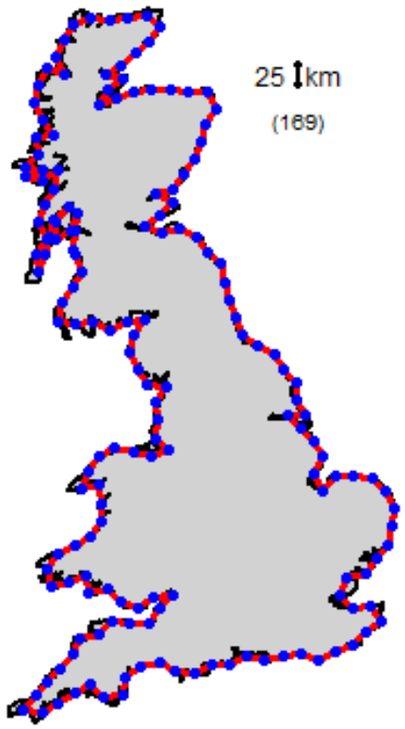


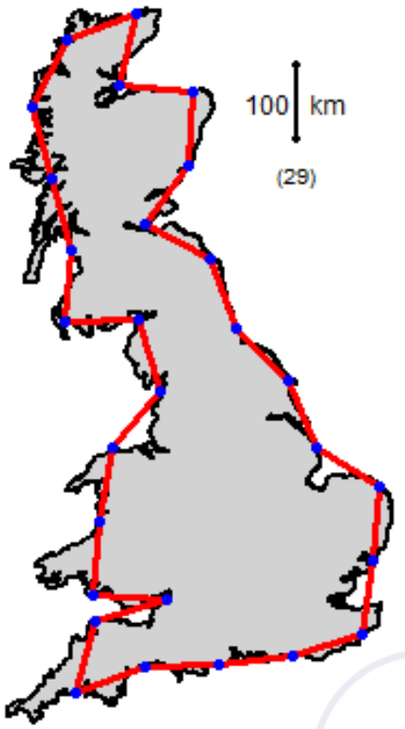
physical “Cloud”

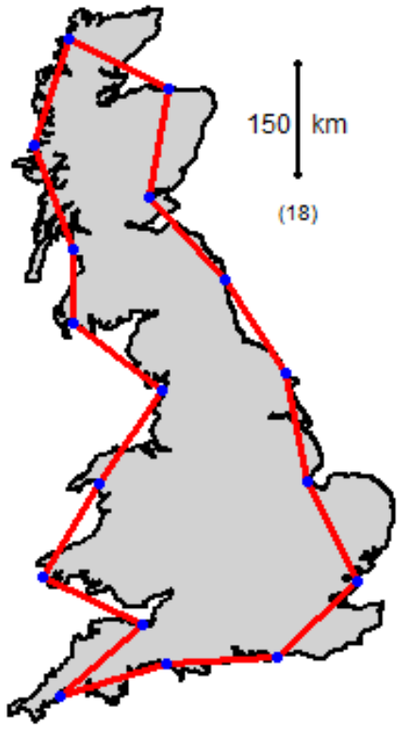


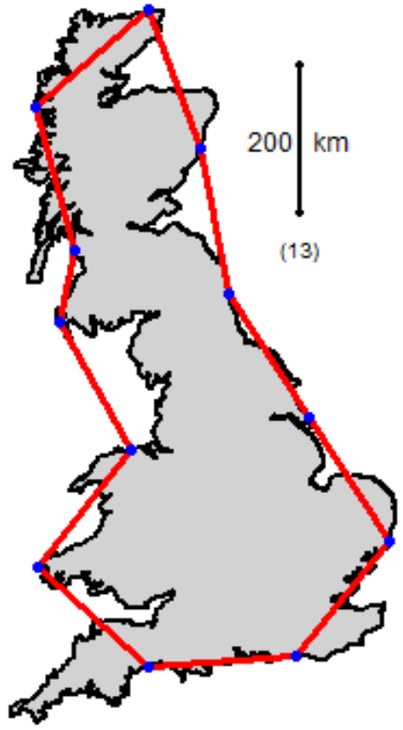


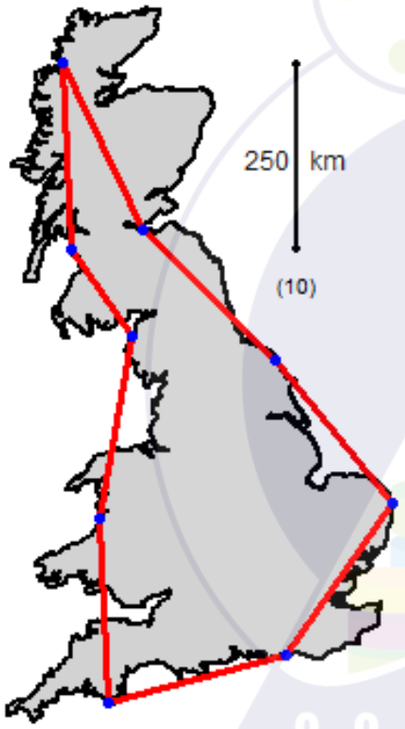












Business Model

Database Model

Real Life

Real Life

Database Model

t_1

t_2

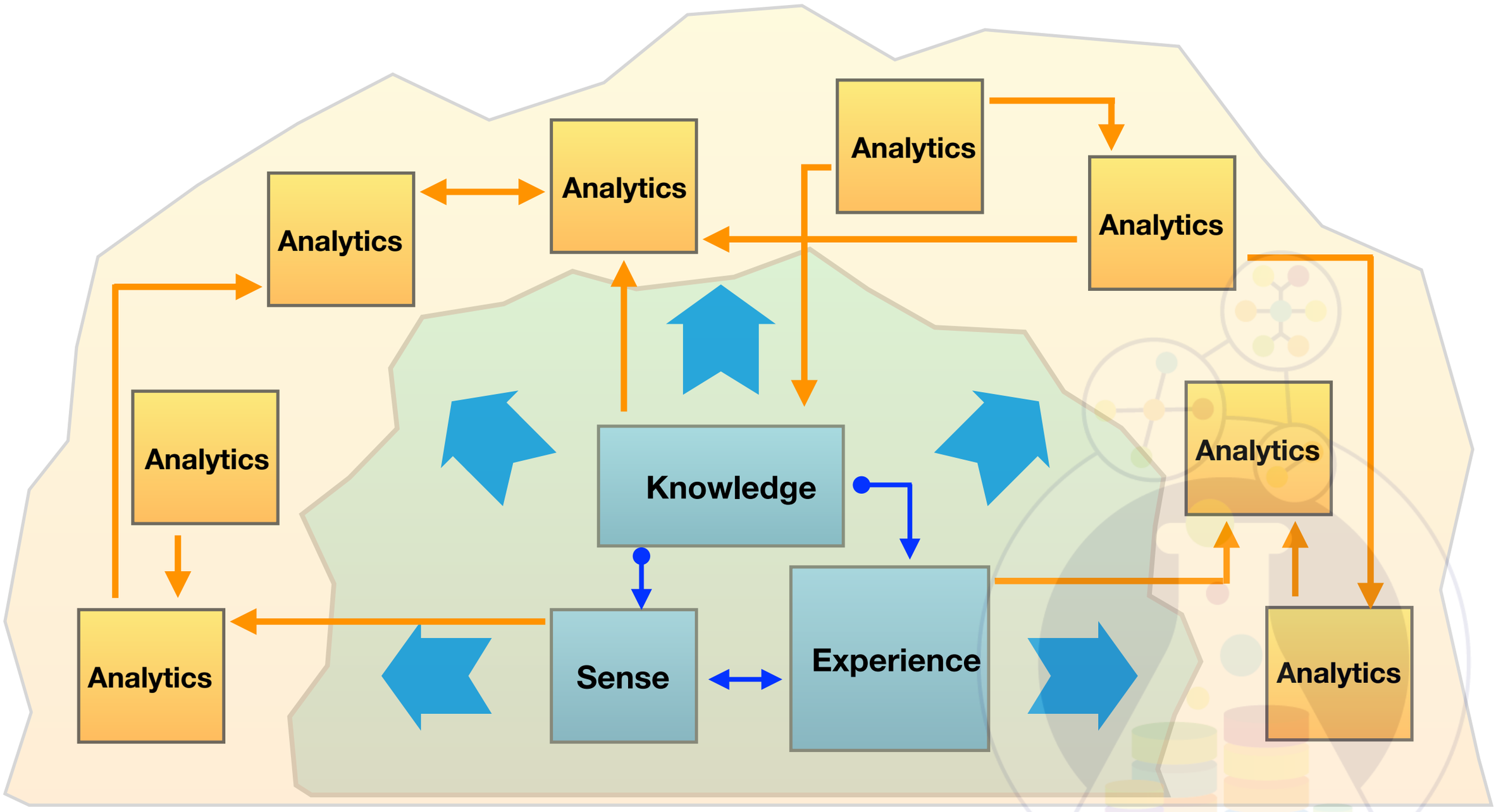
t_3

time-scale

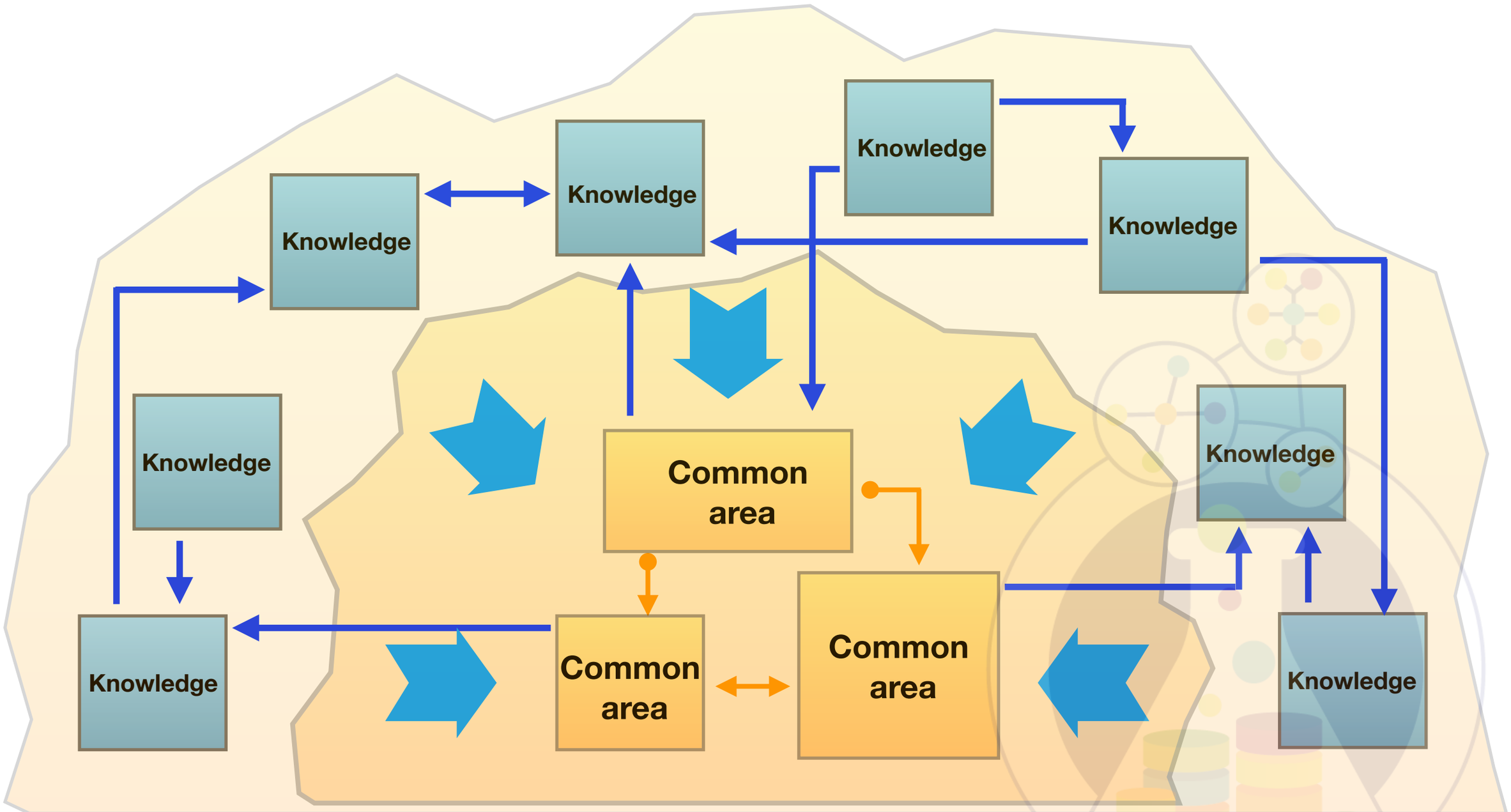
~ releases

- Relational Model
- (Bi-)Temporal Model
- Data Vault Models (1.0, 2.0)
- Graph Model
- EAV Model
- Snowflake/Star Model
- Taxonomy and Ontology
- Anchor Model
- Galaxy Model
- USS Model
- Hybrid Model (hNhM Ya)

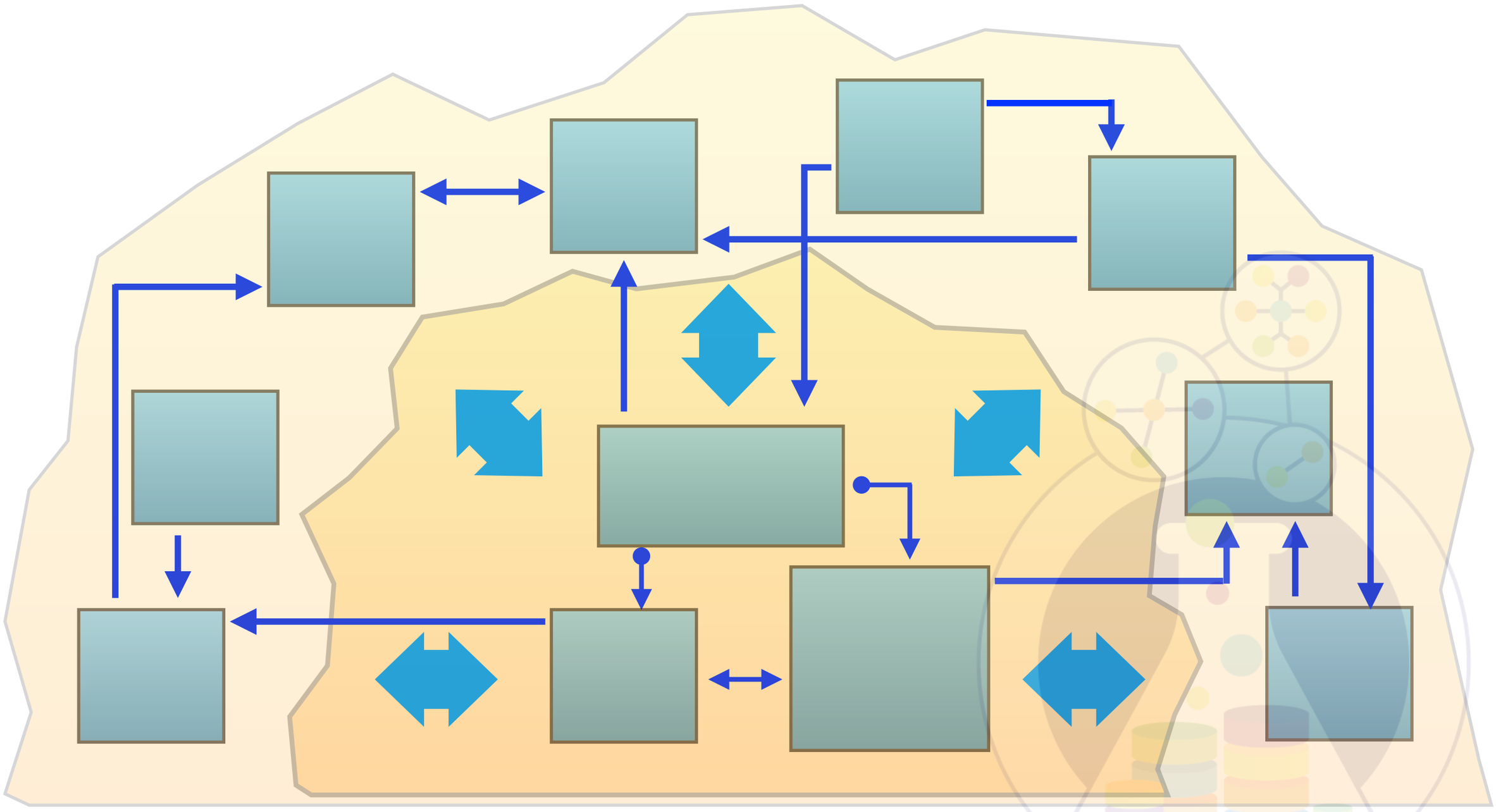
Top-Down analytical strategy



Bottom-Up analytical strategy

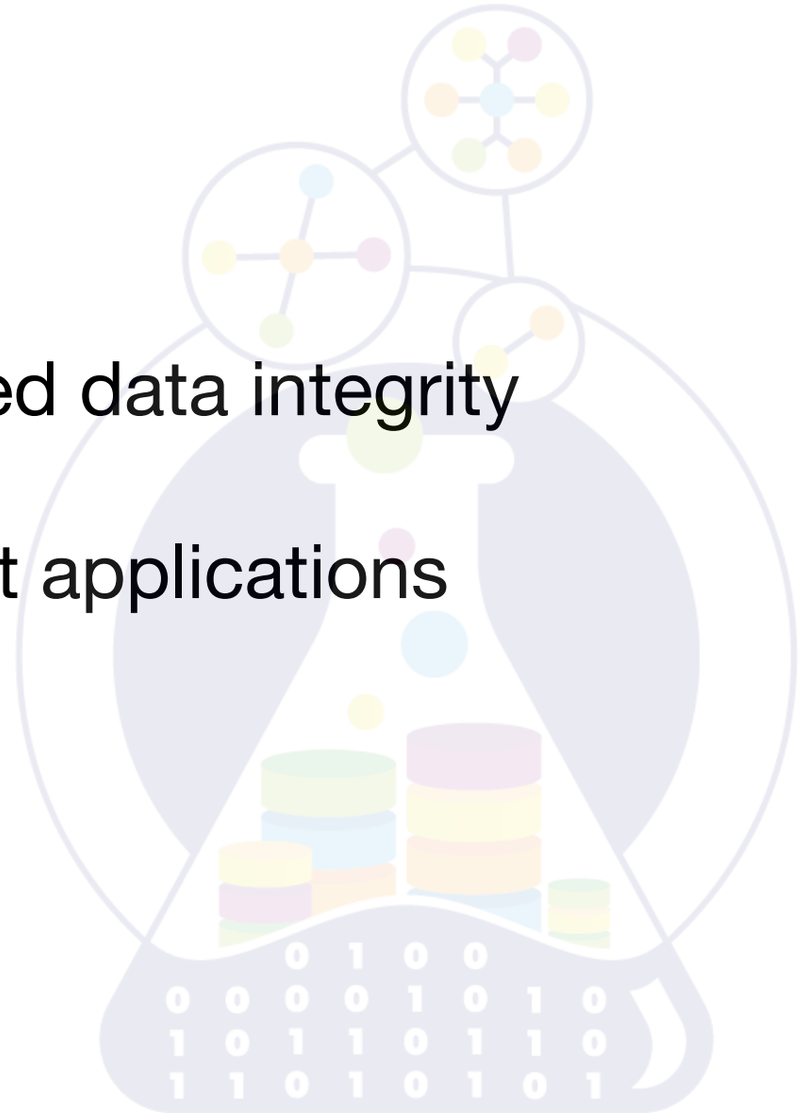


Mixed analytical strategy

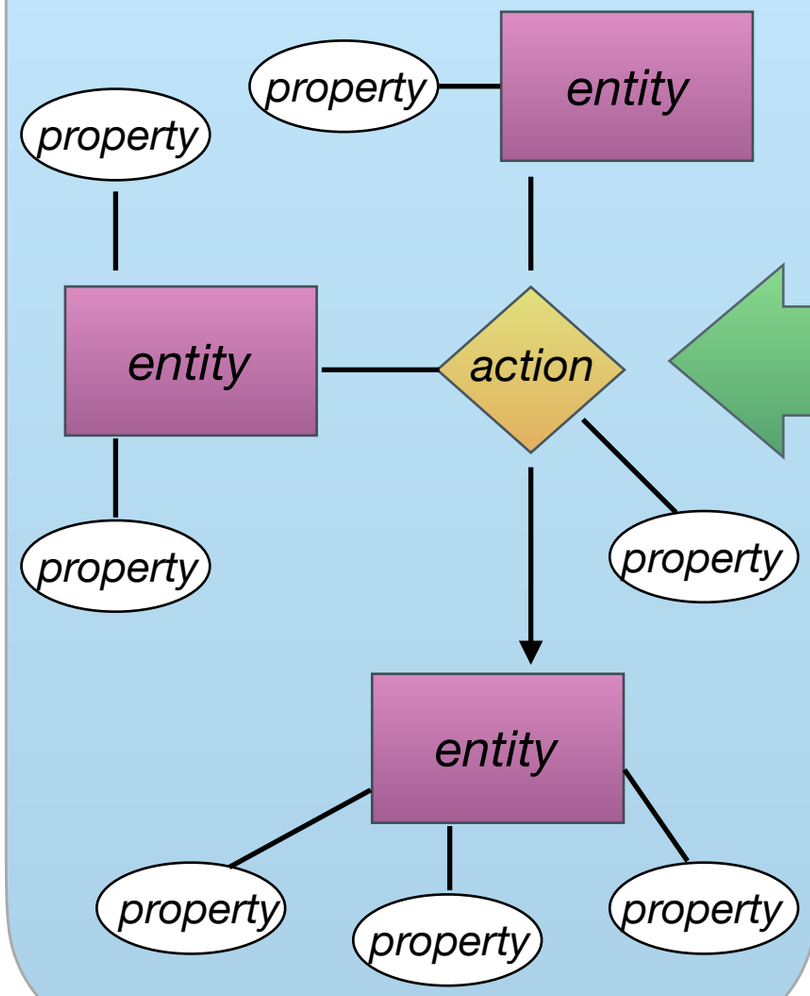


Criteria for well-formed data modelling

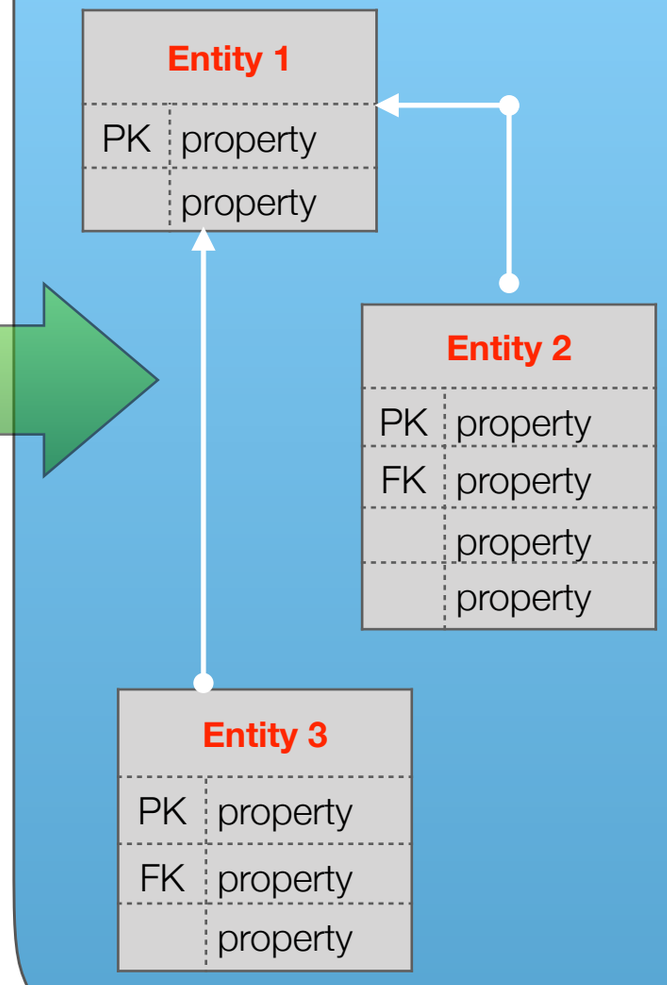
- a structural truth
- a simplicity
- a well-formed relations
- no redundancy and well-formed data integrity
- a possibility to use by different applications
- an extensibility



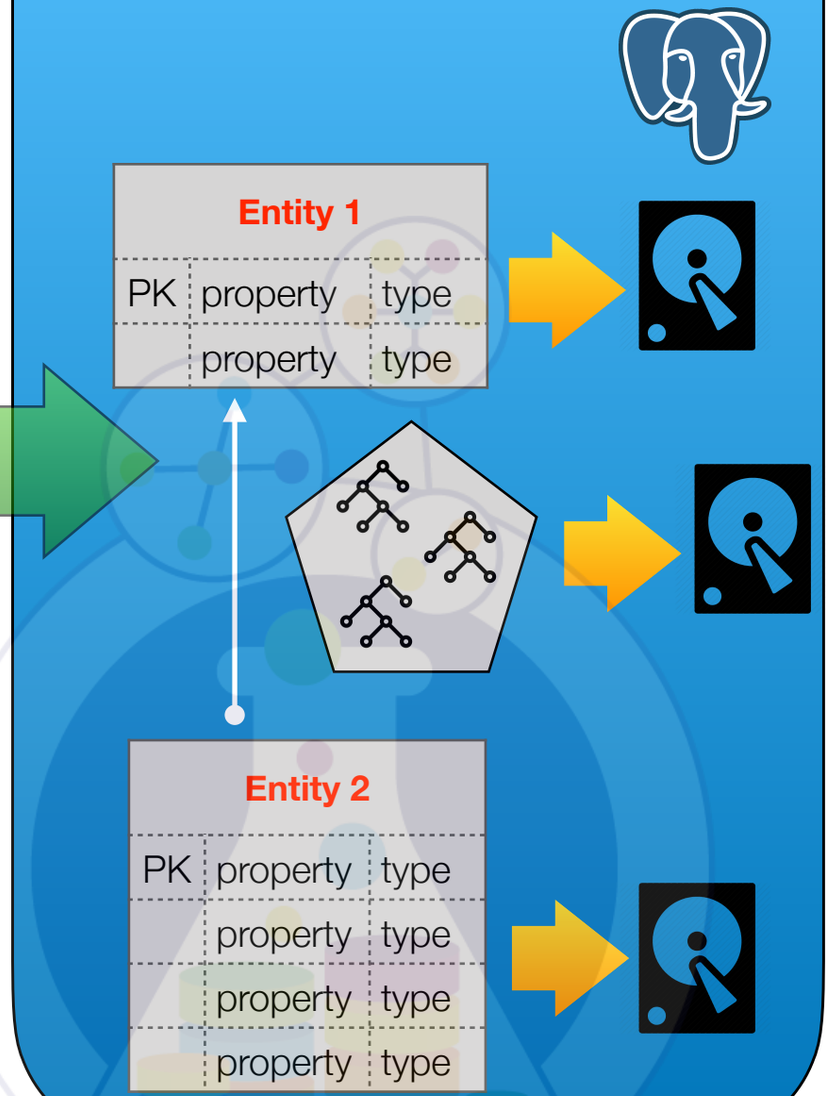
Conceptual Design (Infological Design)



Logical Design (Datalogical Design)



Physical Design

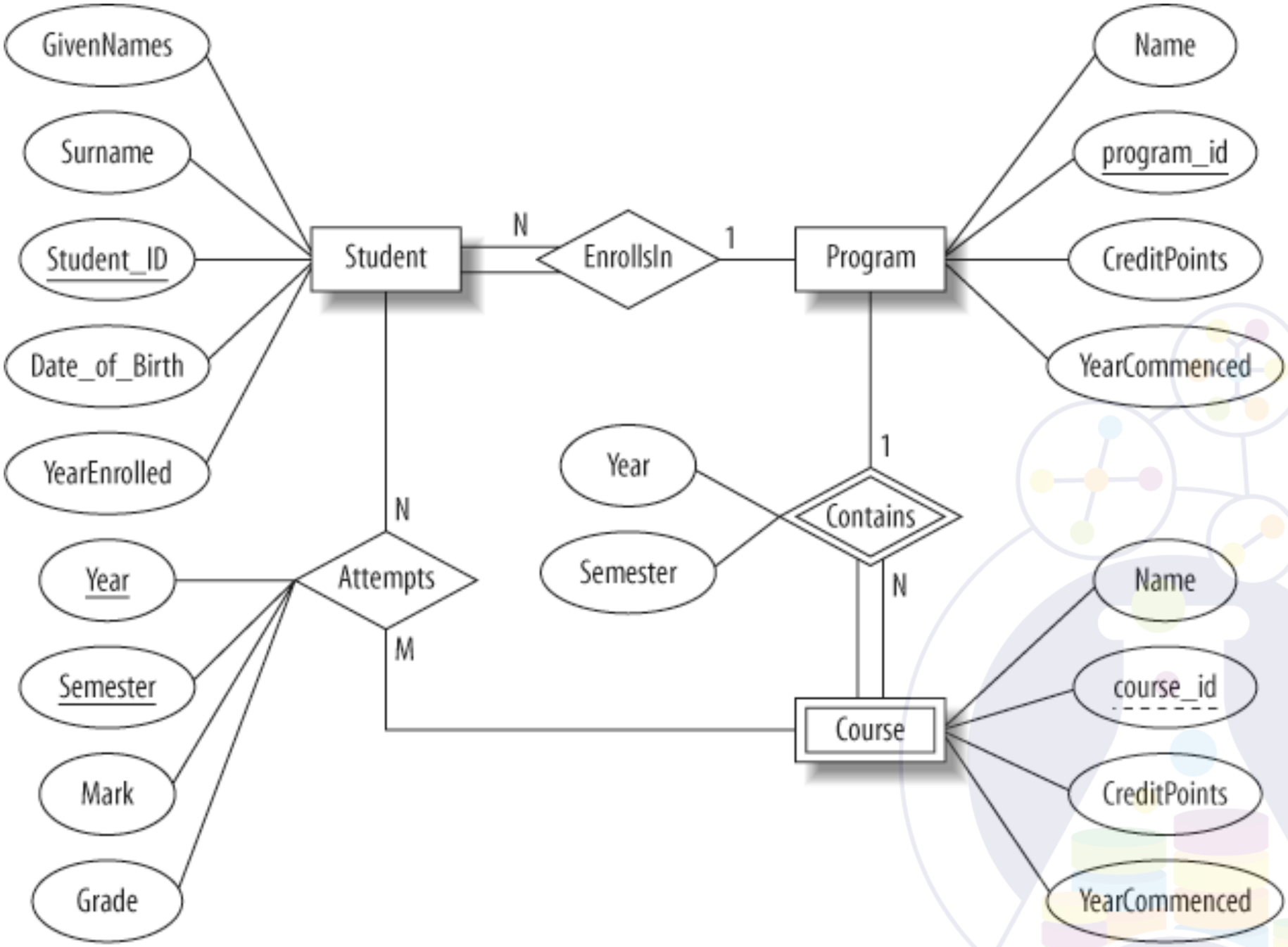


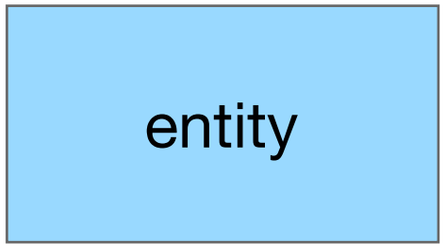
Dr. Peter Pin-Shan Chen

One of the creators of **ER modelling** at 1976

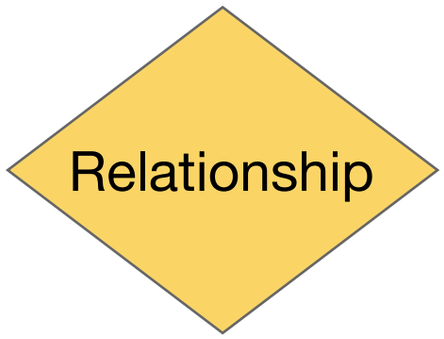
ER Model is ANSI standard for IRDS.
UML is based on ER Modelling

- ERWIN from Computer Associates
- Designer from Oracle
- PowerDesigner from Sybase
- Microsoft Visio from Microsoft
- Draw.io
- Lucidchart
- ERDPlus

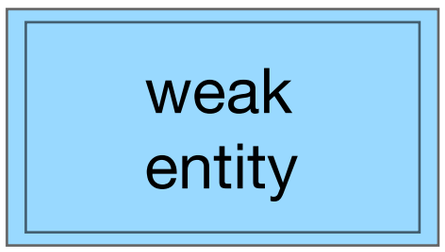




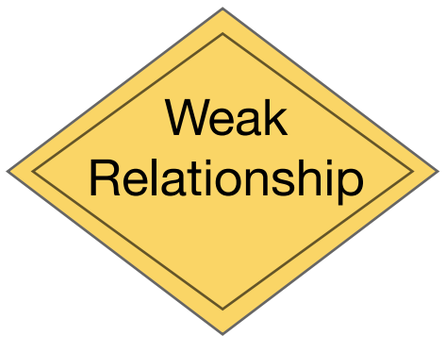
- abstract object and definable thing—such as a **person**, **object**, **concept** or **event** that can have data stored about it



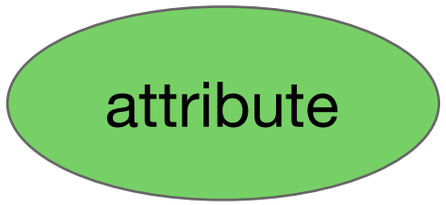
- how **entities** act upon each other or are associated with each other



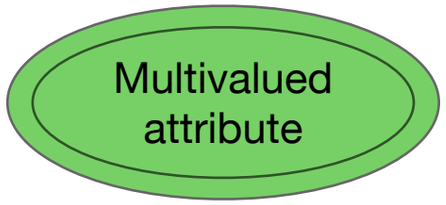
- abstract object with dependency of strong **entity**



- relation between **weak entity** and **strong entity**

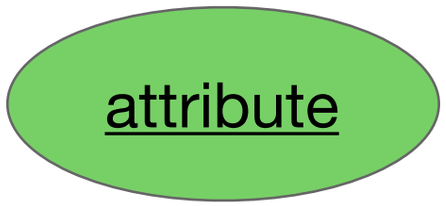


– an **attribute** or characteristic of an **entity**

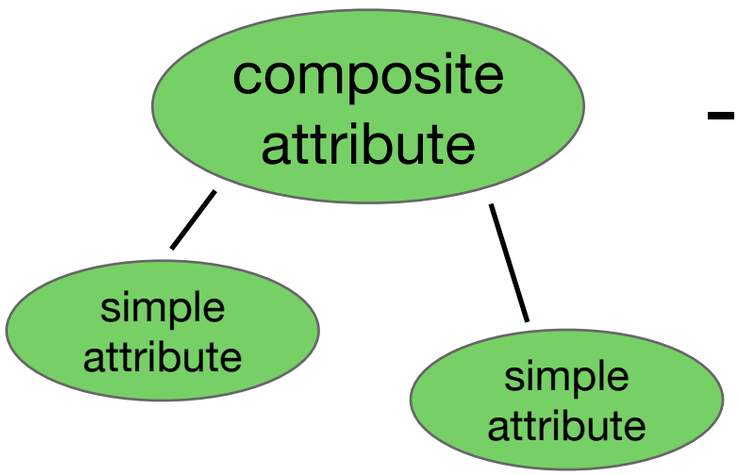


– an **attribute** with several values

– a calculated **attribute** based on other **attributes**



– a key **attribute** is identifying an **entity**



– a composite **attribute** of simple properties

Hierarchy of entities

Supertype

Supertypes or subtypes

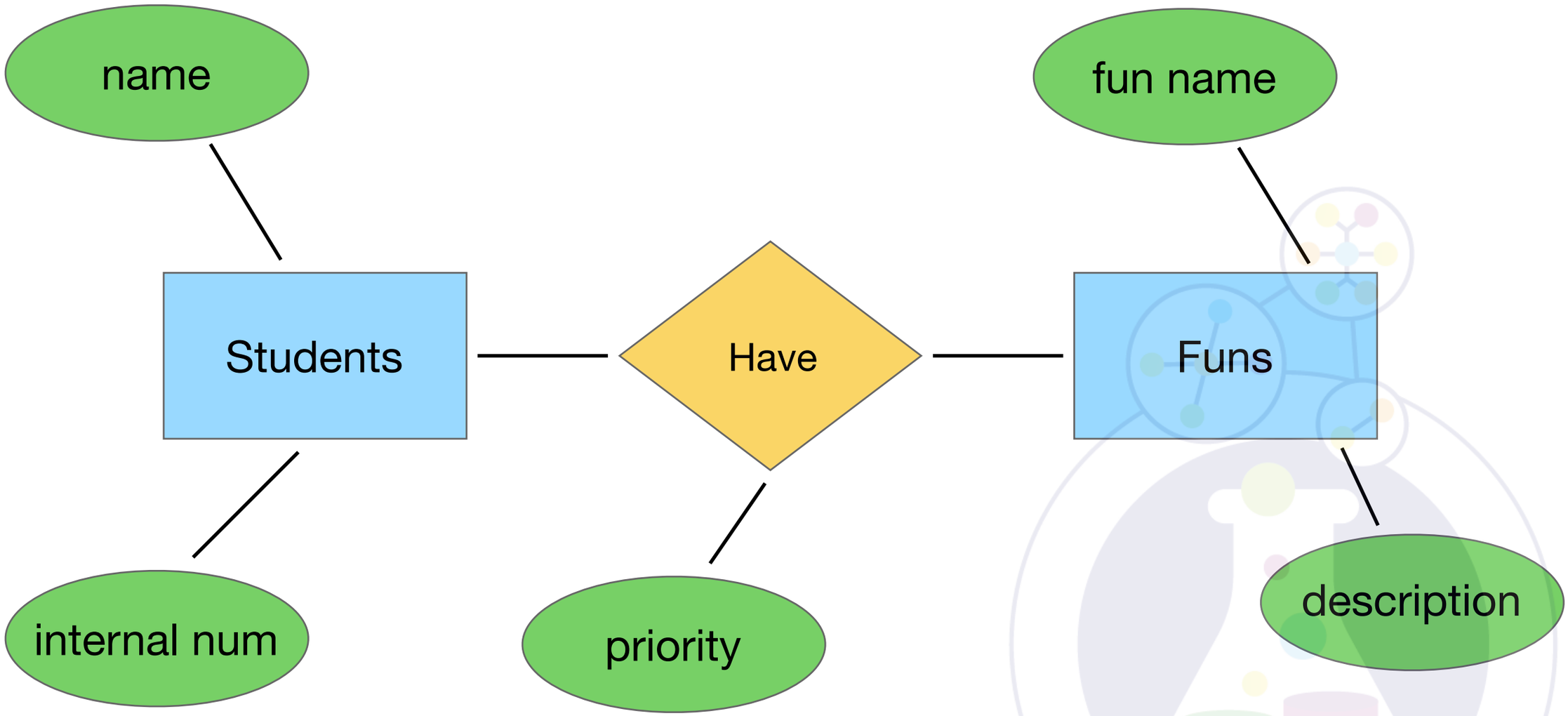
is a

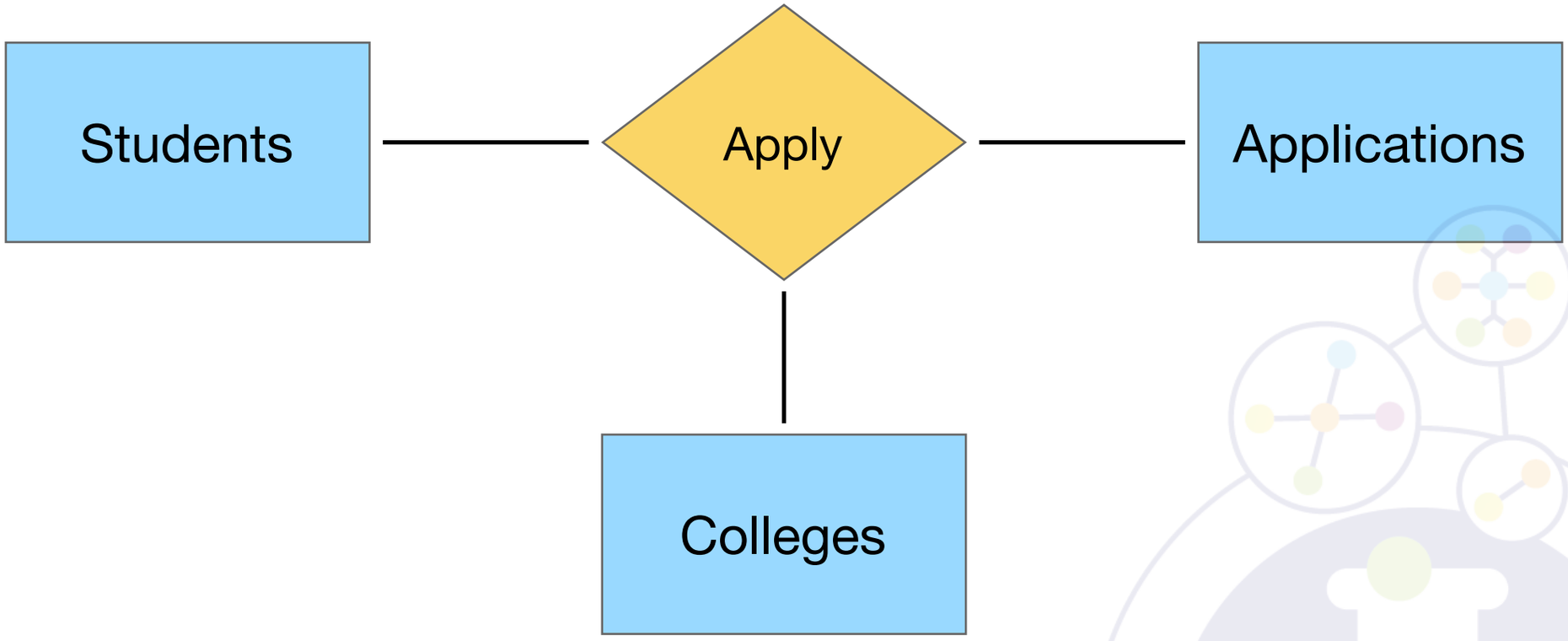
is a

is a

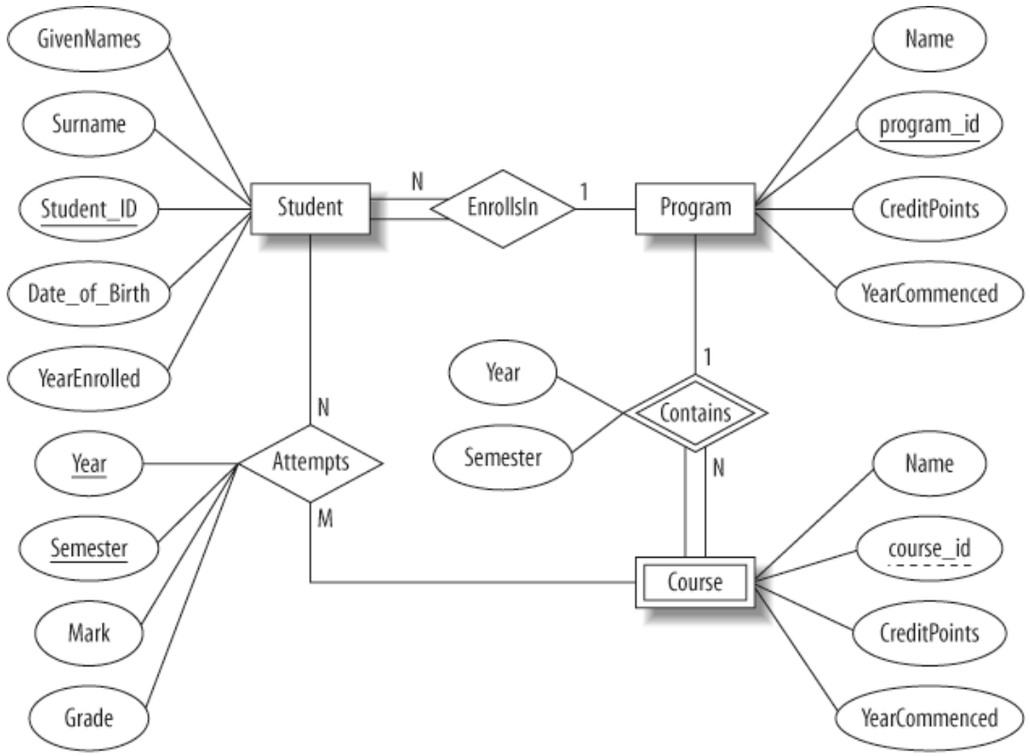
is a

is a



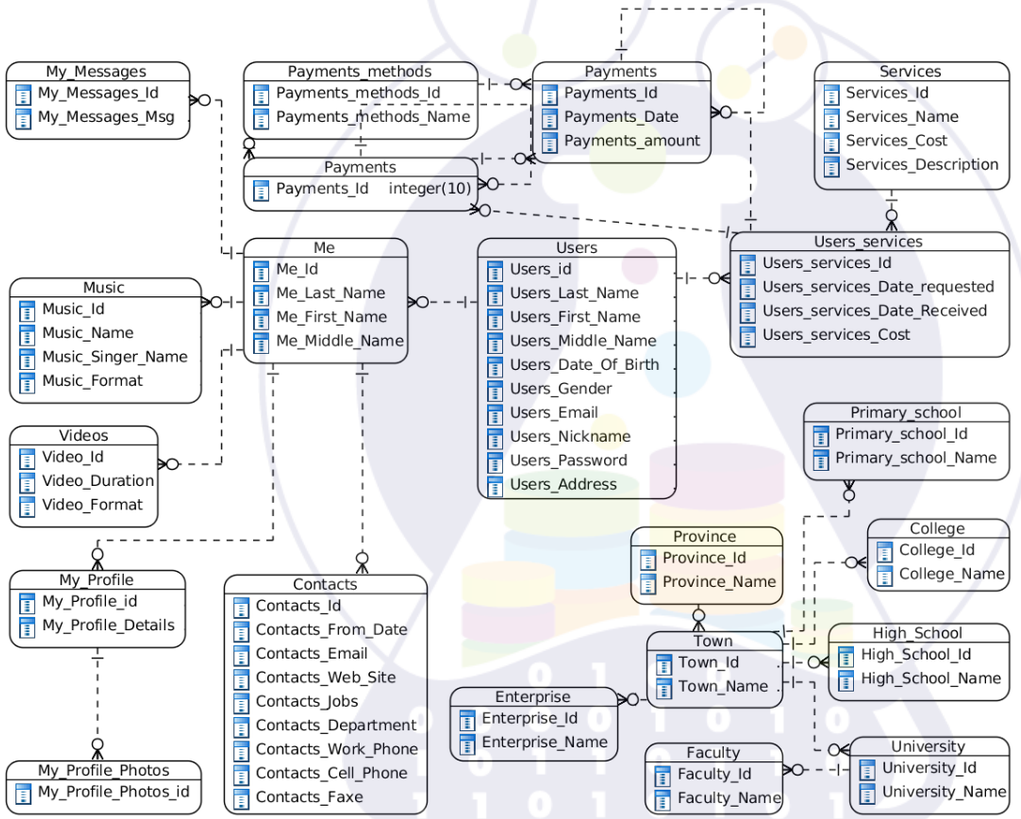


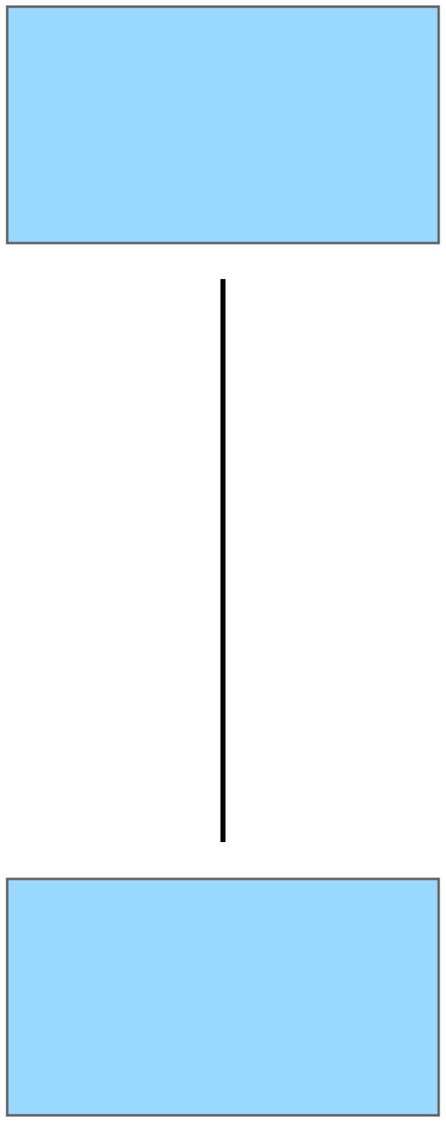
$$Apply = (Student, College, Application)$$



schemata

database instance





One

Many

One (and only one)

Zero or one

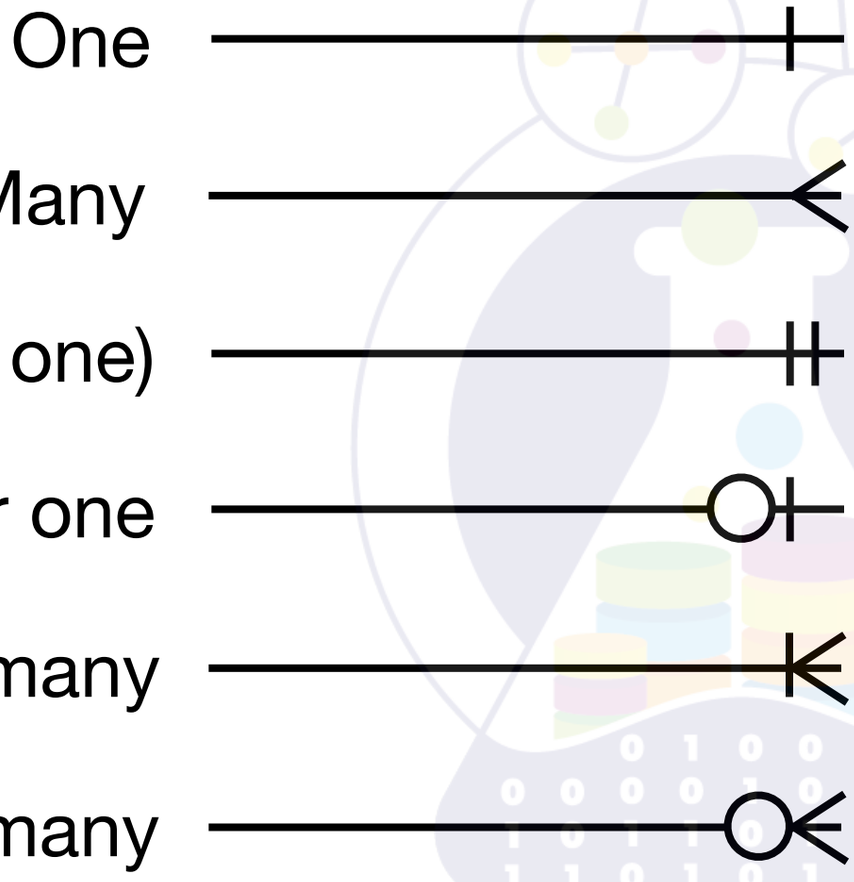
One or many

Zero or many

Student
StudentID
FirstName
SecondName
LastName
Address
Phone

StudentHobby
StudentID
HobbyName
StudentName

HobbyItems
ItemID
ItemName
Description
Image



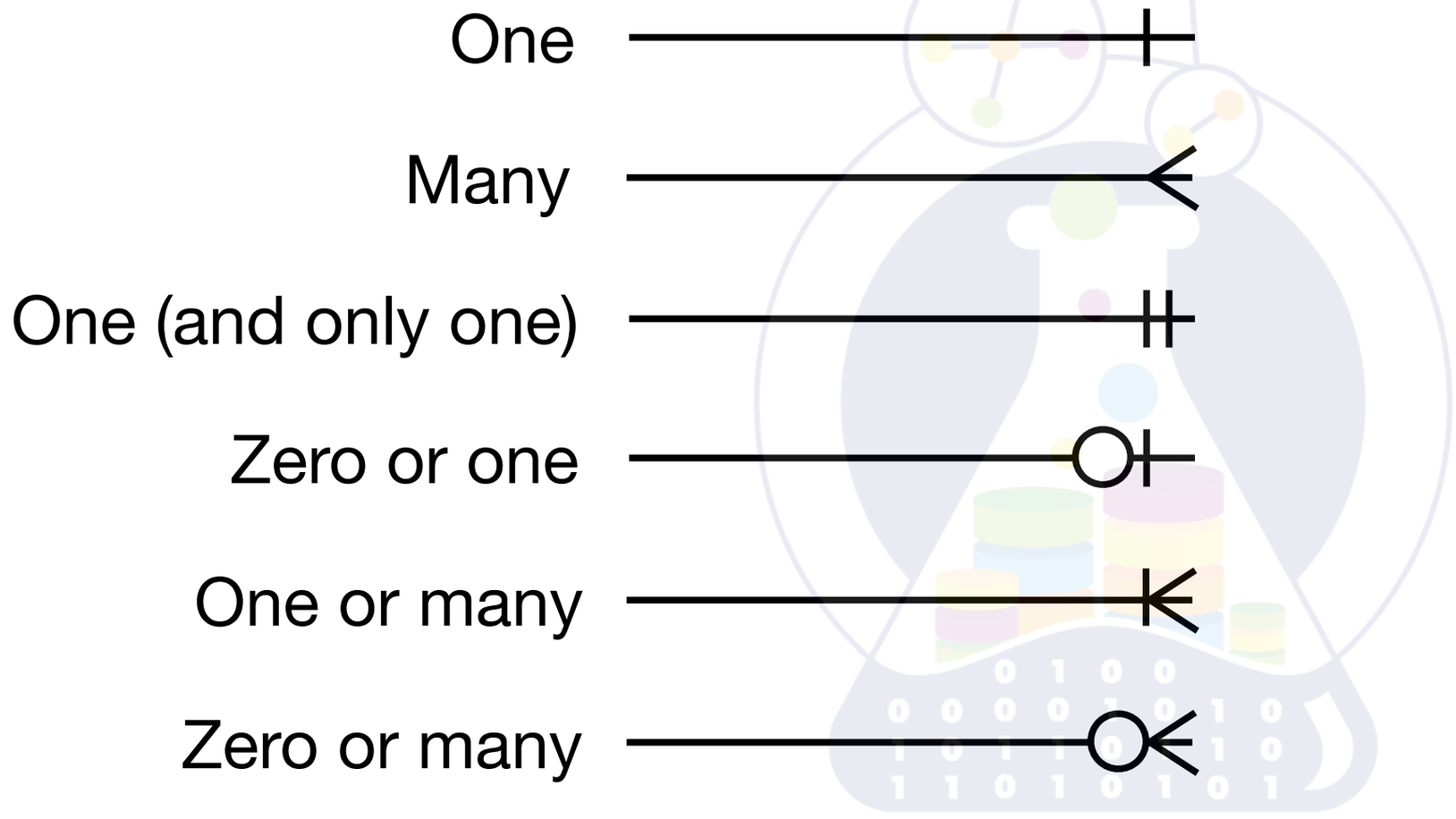
Student
StudentID
FirstName
SecondName
LastName
Address
Phone

1 1 — 0 many

min 1 max 1 — min 0 max many

StudentHobby
StudentID
HobbyName
StudentName

HobbyItems
ItemID
ItemName
Description
Image



Student
StudentID
FirstName
SecondName
LastName
Address
Phone

StudentHobby
StudentID
HobbyName
StudentName

HobbyItems
ItemID
ItemName
Description
Image

many to many

0 min y max

1 min y max

One

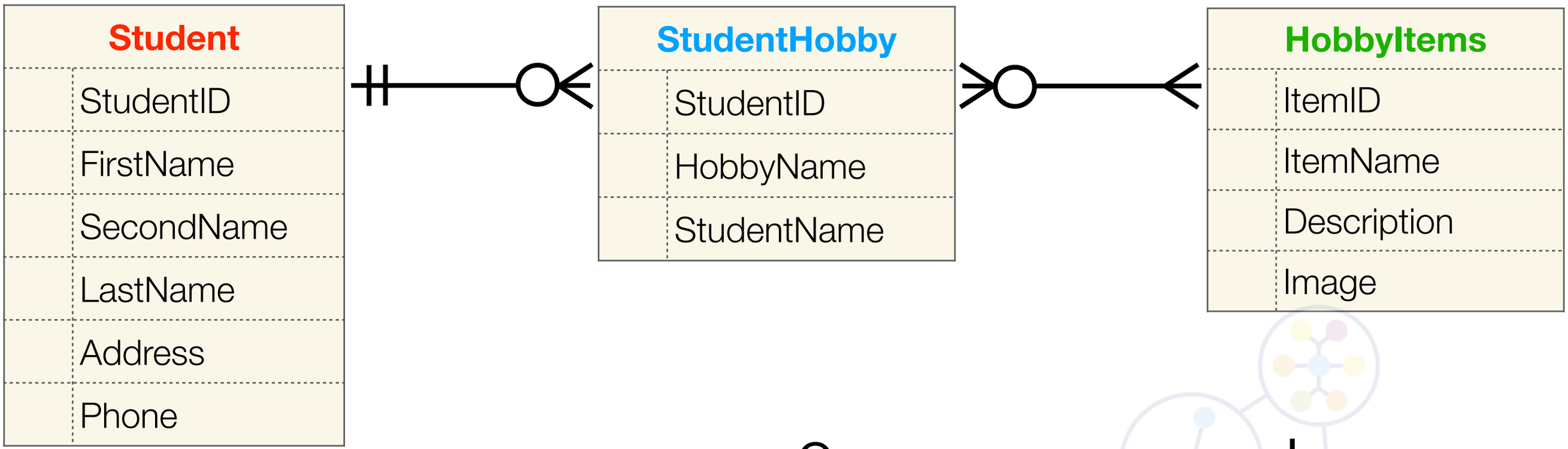
Many

One (and only one)

Zero or one

One or many

Zero or many



One

Many

One (and only one)

Zero or one

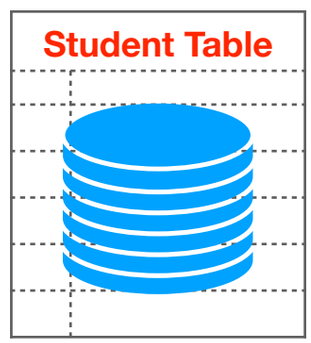
One or many

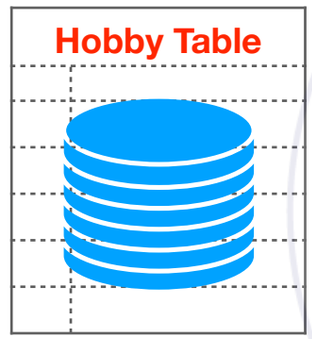
Zero or many

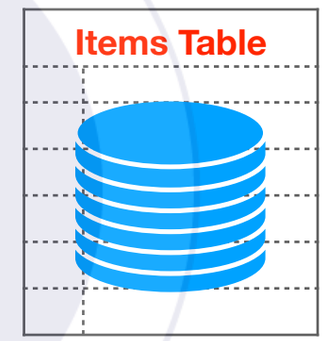
Student	
PK	StudentID
	FirstName
	SecondName
	LastName
	Address
	Phone

StudentHobby	
FK	StudentID
	HobbyName
	StudentName
FK	ItemID

HobbyItems	
PK	ItemID
	ItemName
	Description
	Image





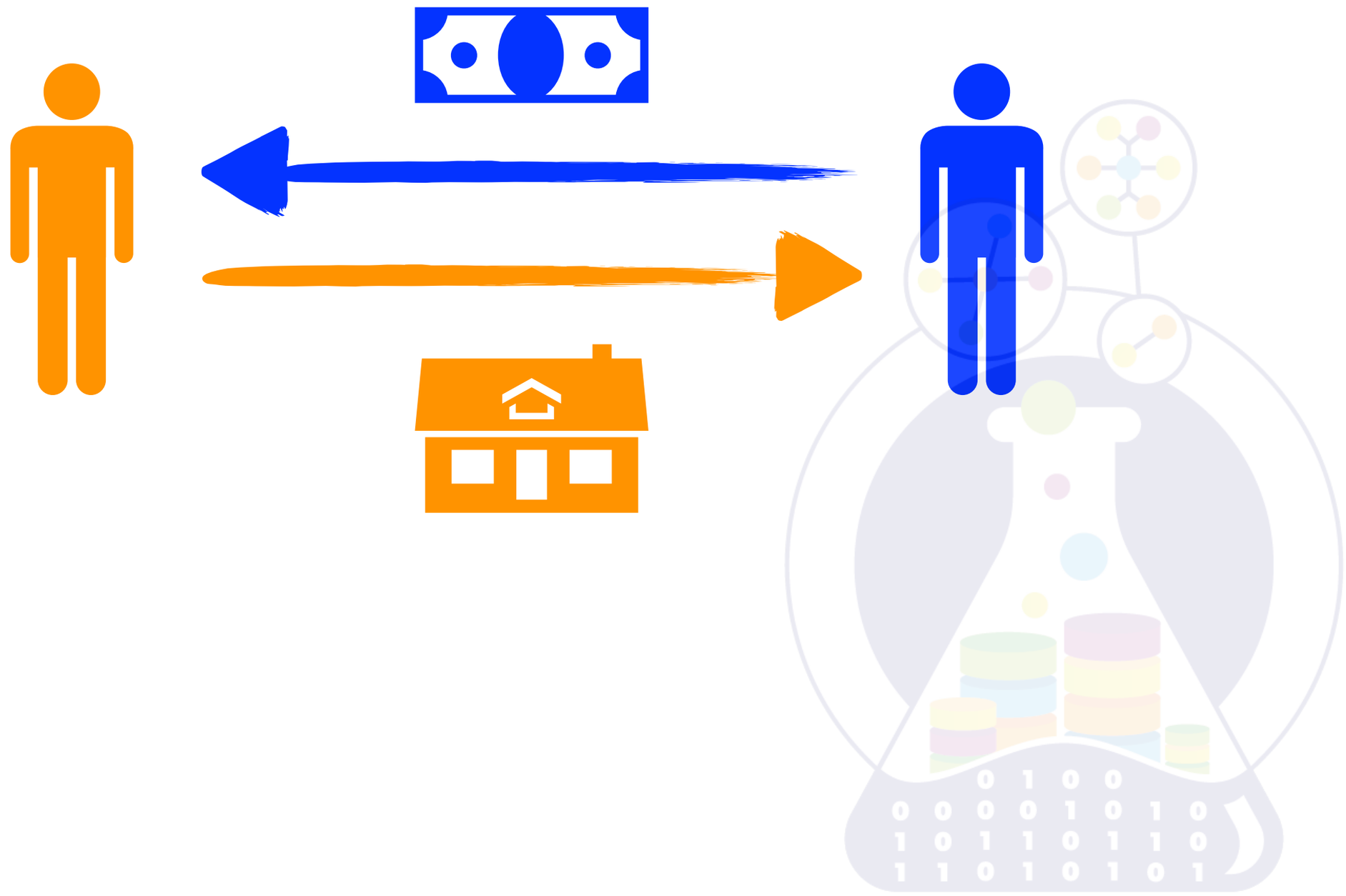


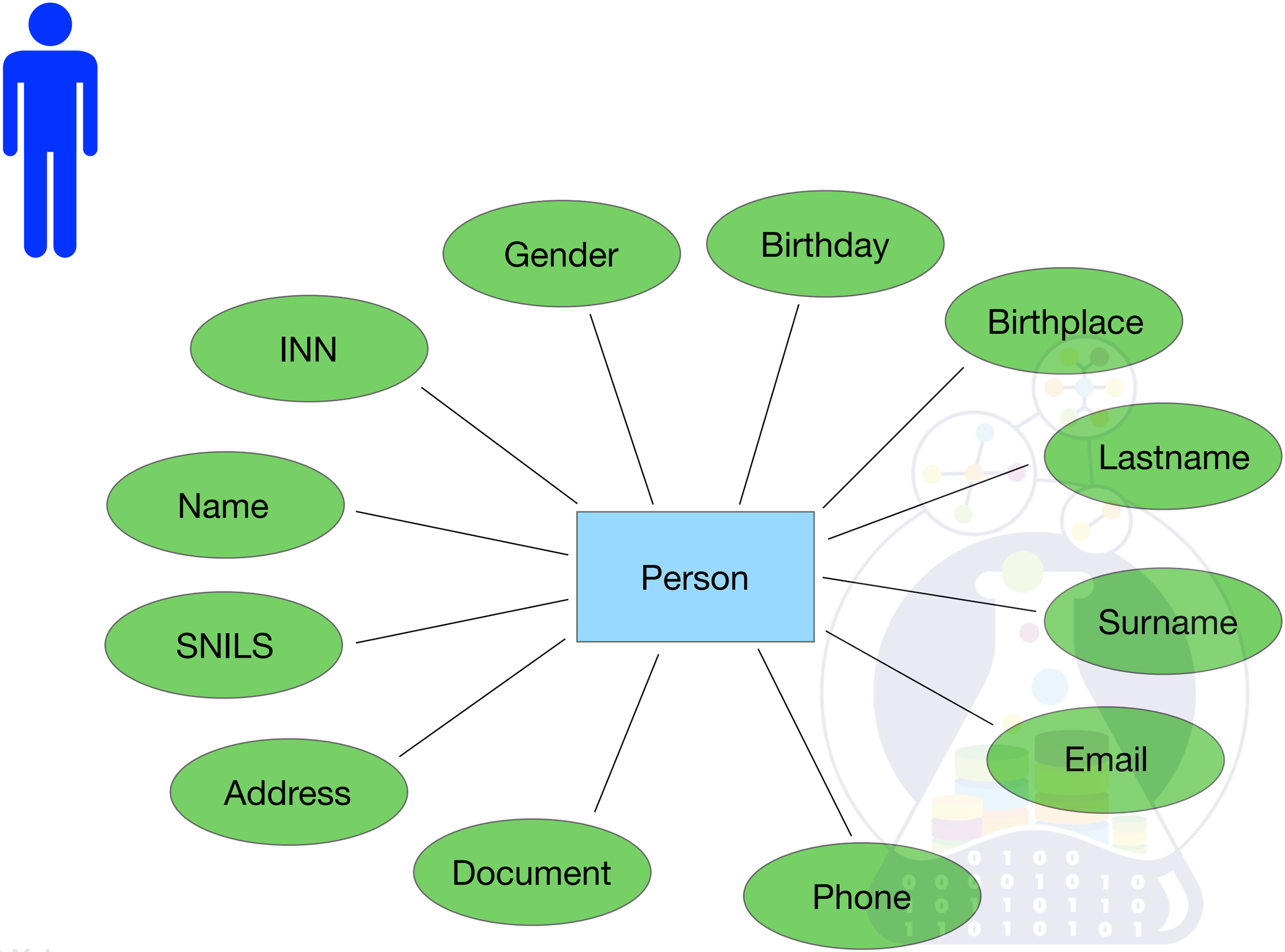
Student		
PK	StudentID	bigint
	FirstName	varchar
	SecondName	varchar
	LastName	varchar
	Address	varchar
	Phone	varchar

StudentHobby		
FK, UK	StudentID	bigint
FK, UK	HobbyID	bigint
	StudentName	varchar
FK, UK	ItemID	bigint

Hobby		
PK	HobbyID	bigint
	HobbyName	varchar

HobbyItems		
PK	ItemID	bigint
	ItemName	varchar
	Description	text
	Image	bytes





Registration number

Rooms

Floor

Square

Initial Price

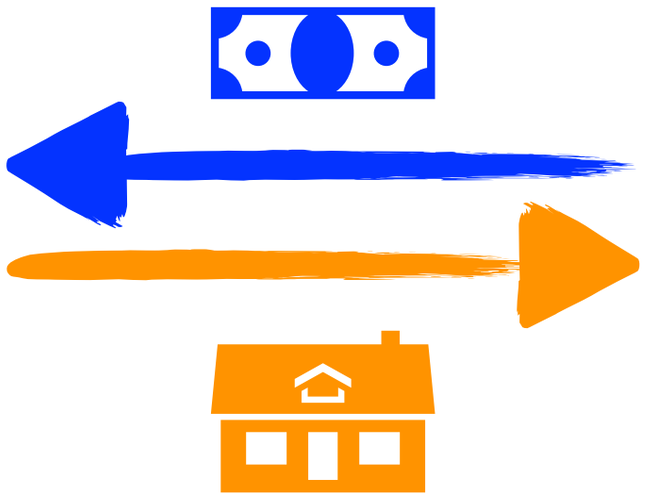
Name

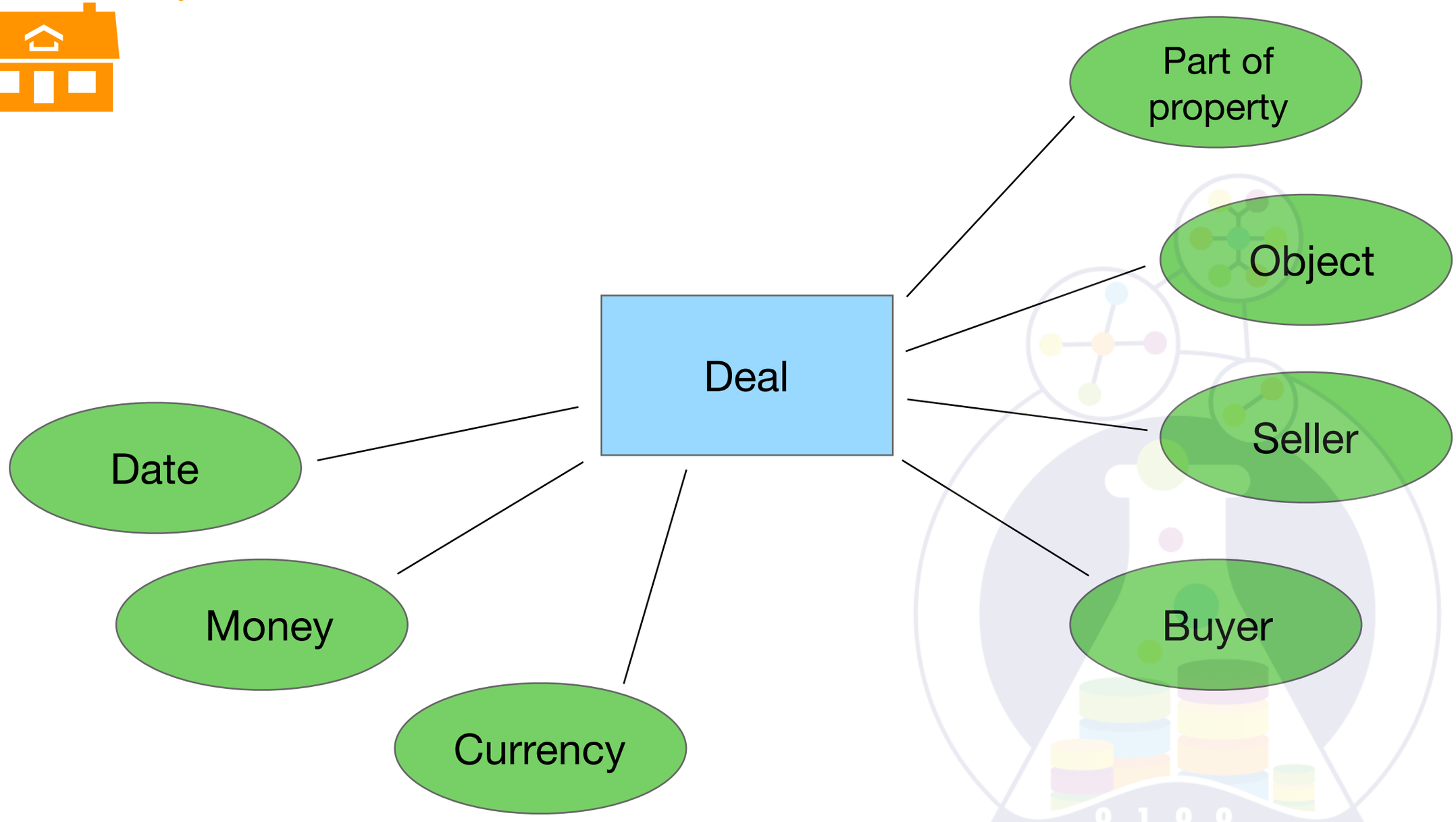
Address

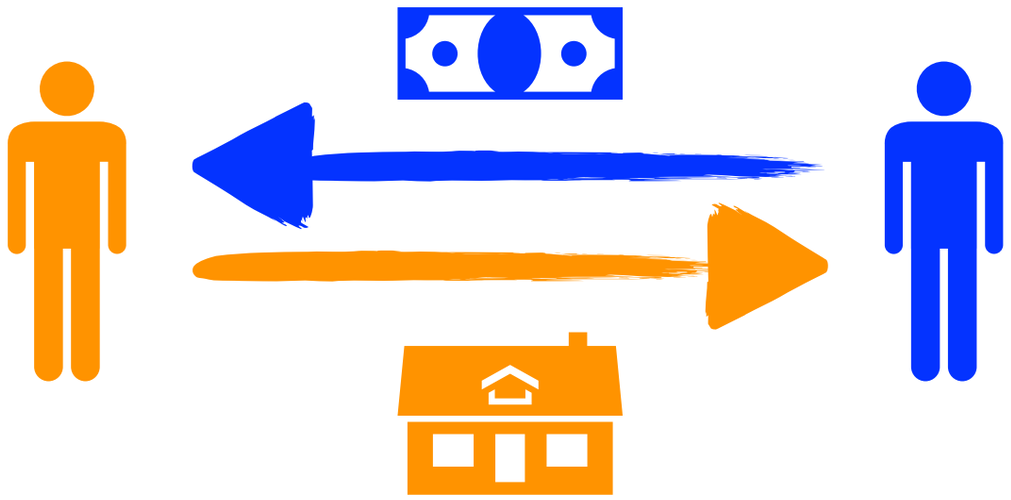
Type of object

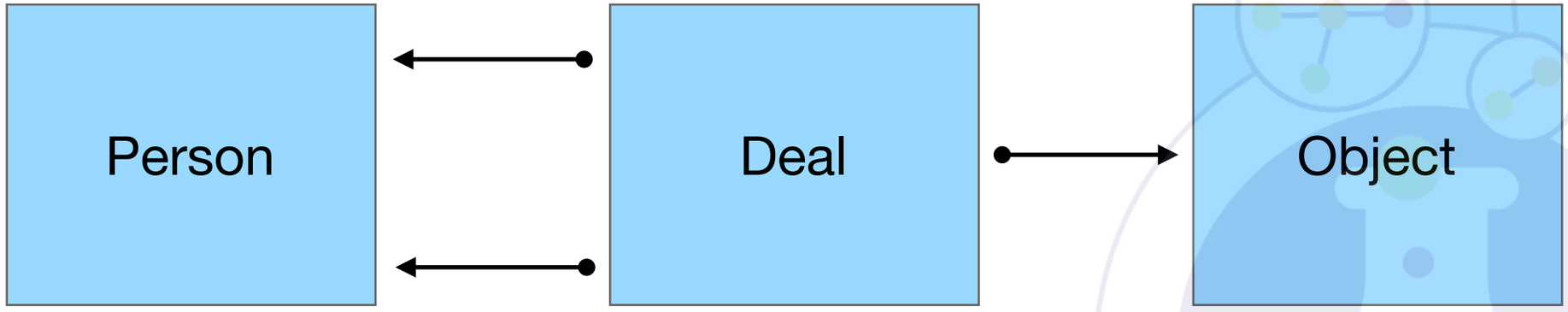
Document

Object

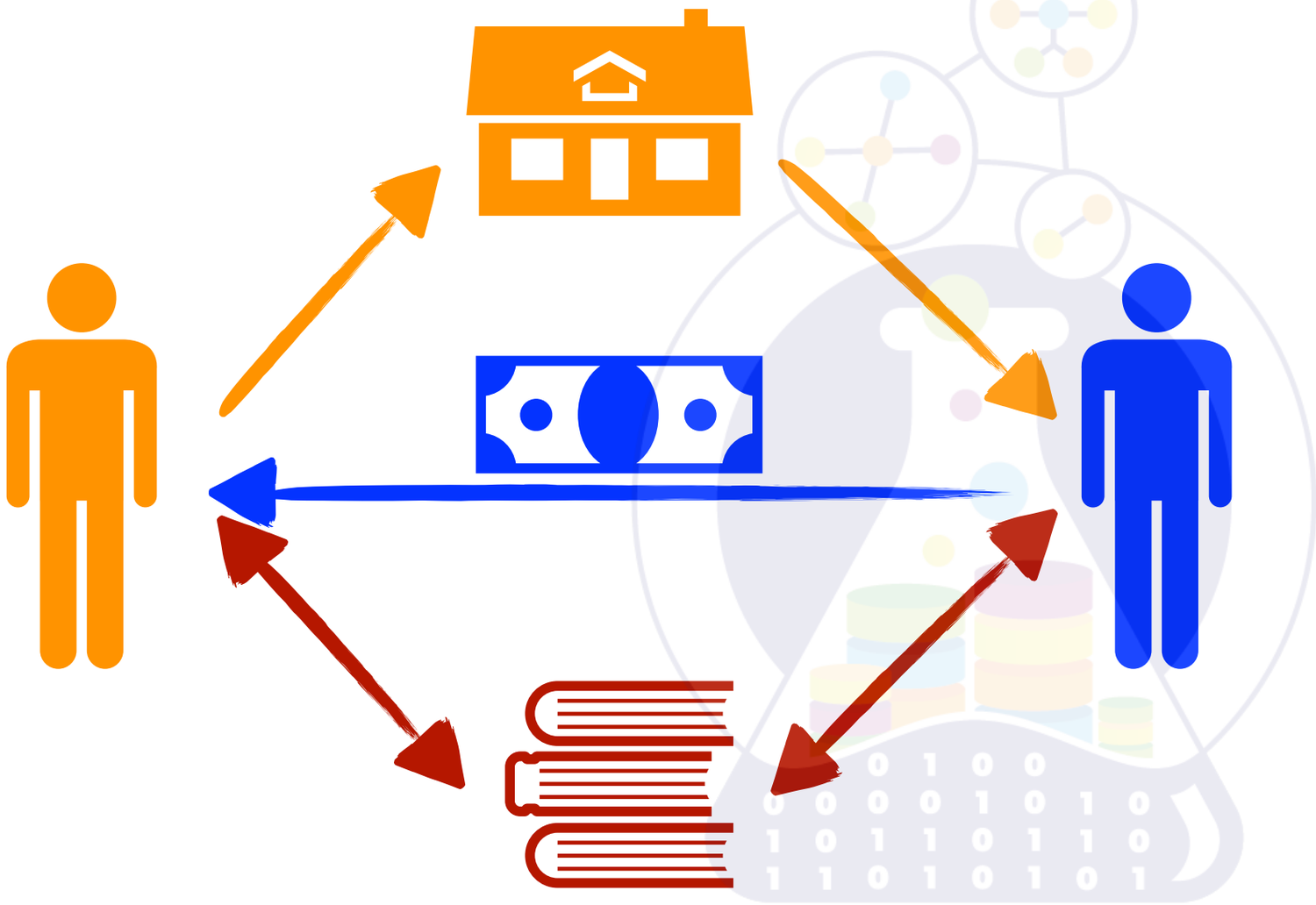


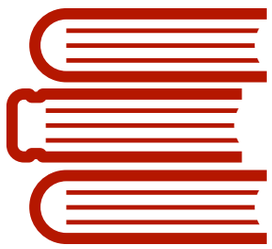


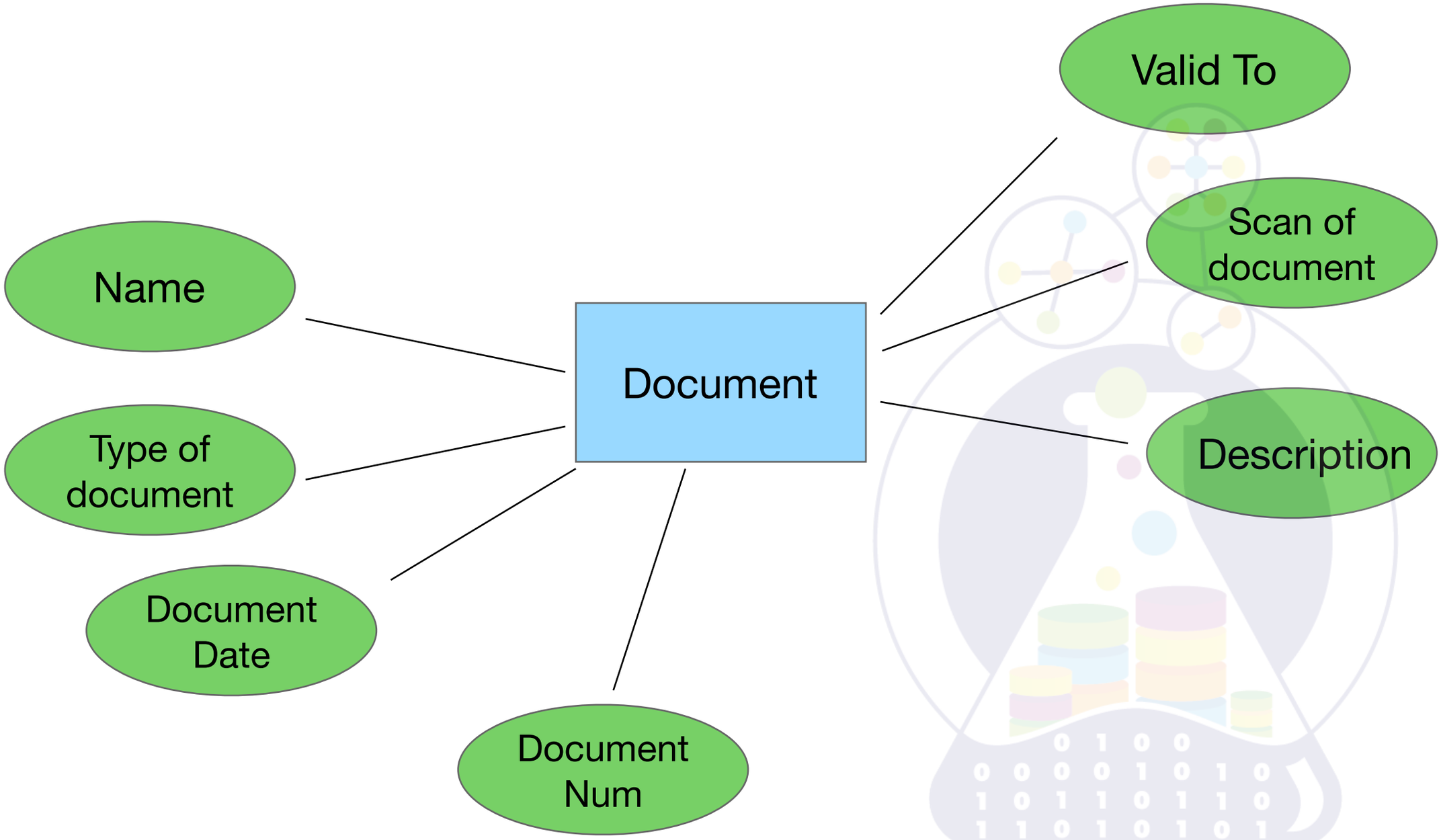


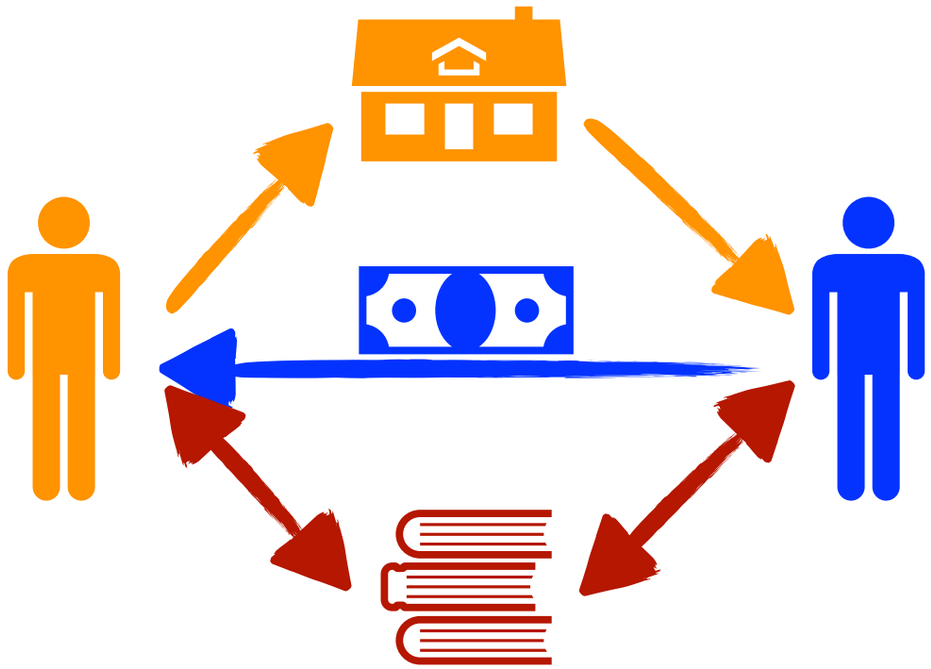


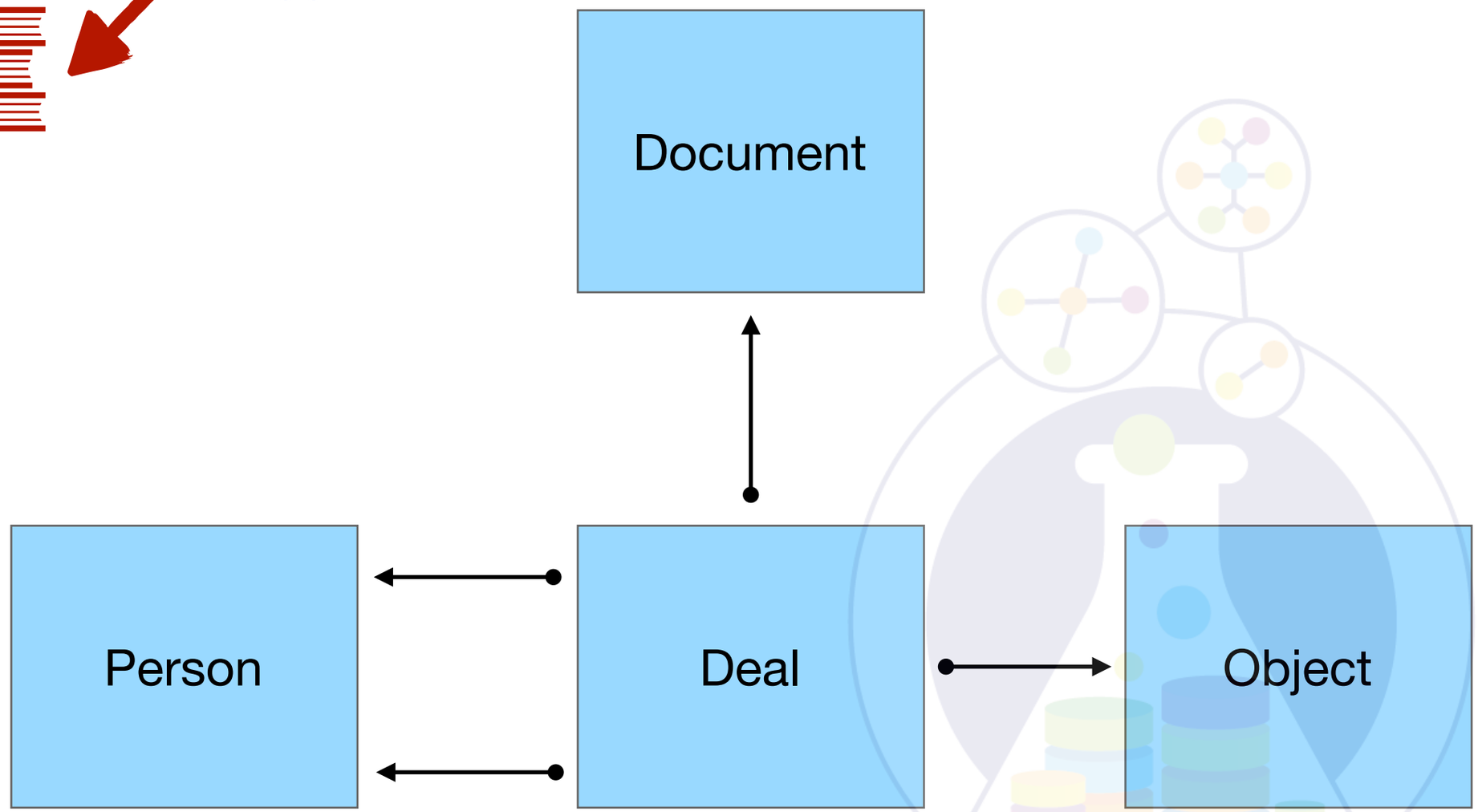
It’s description not right legitimate a deal of!

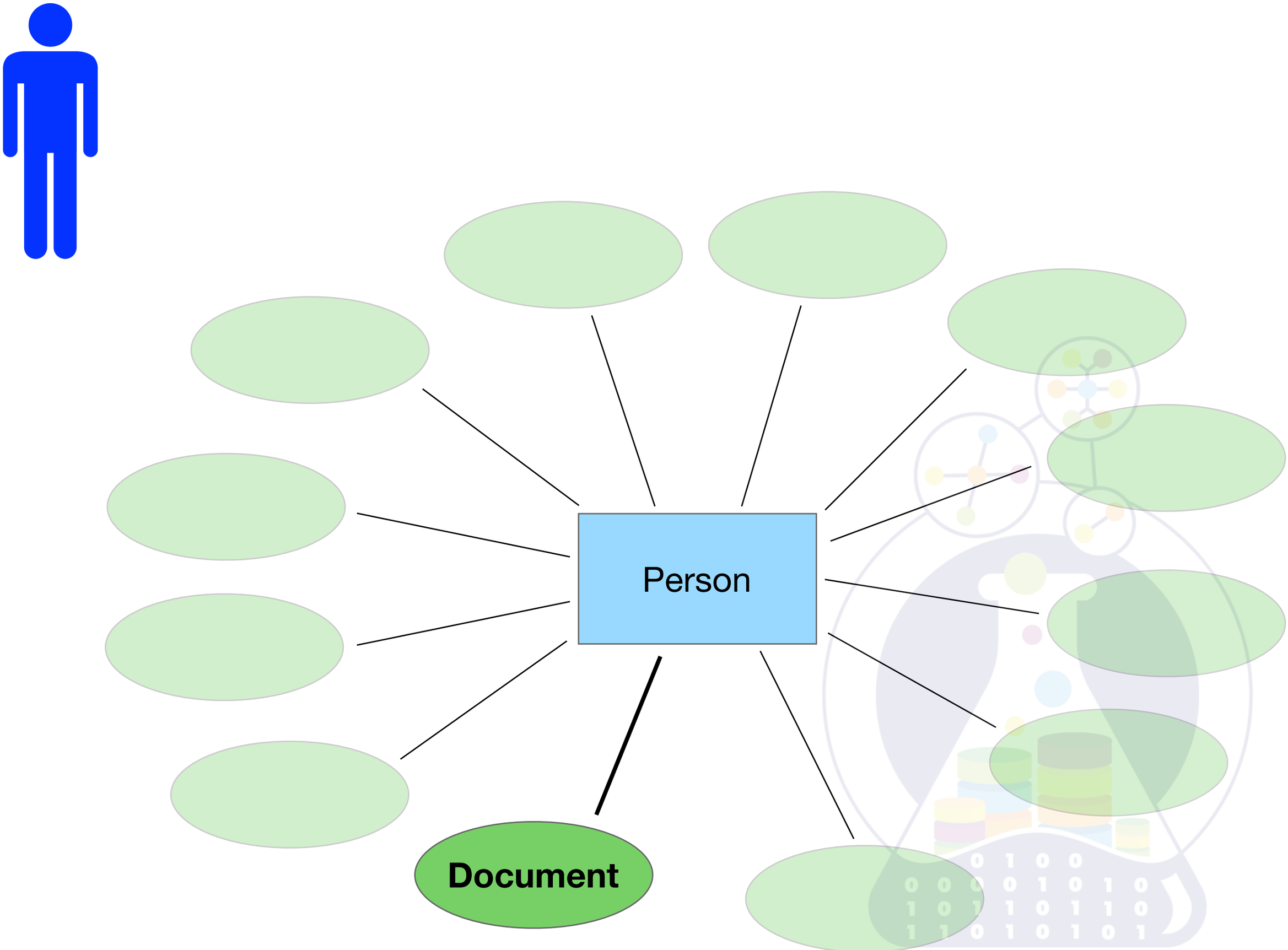


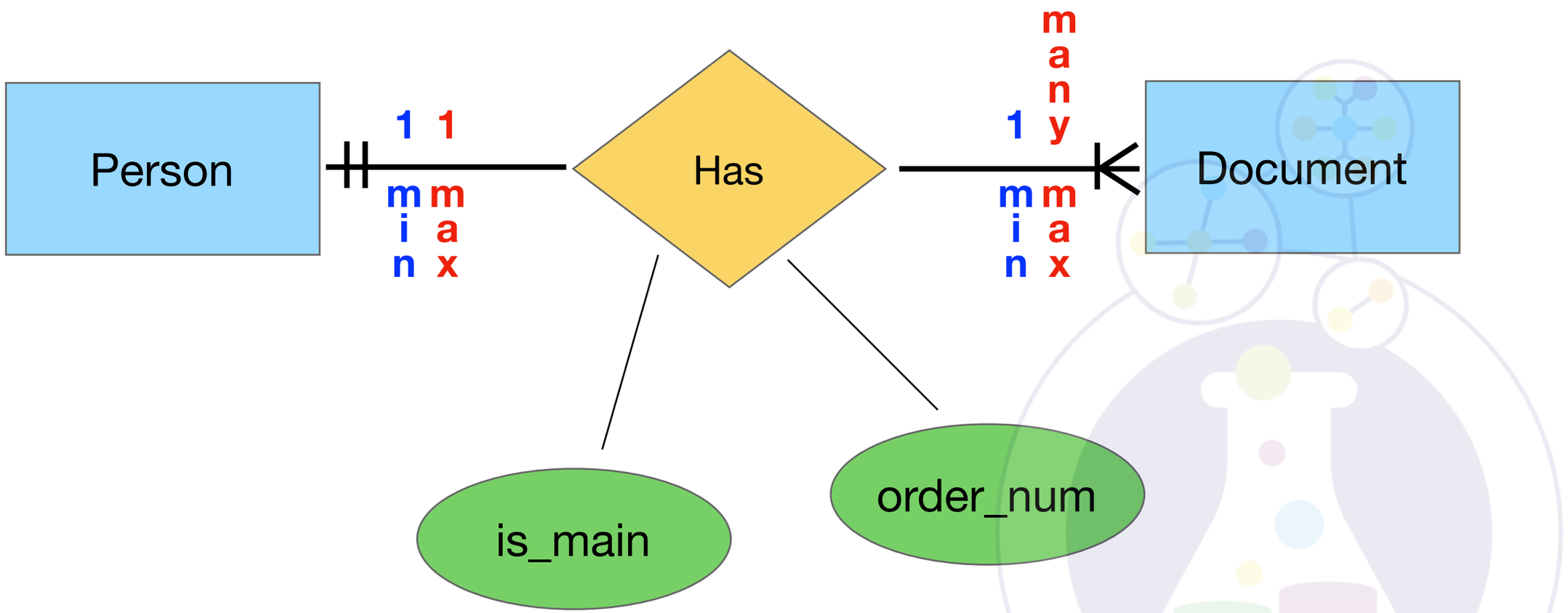


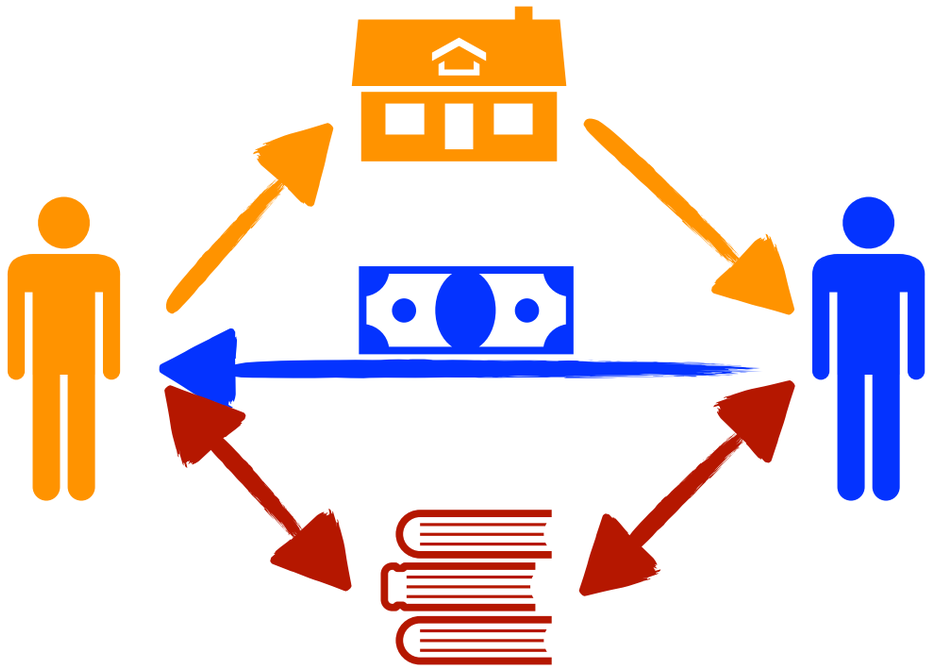


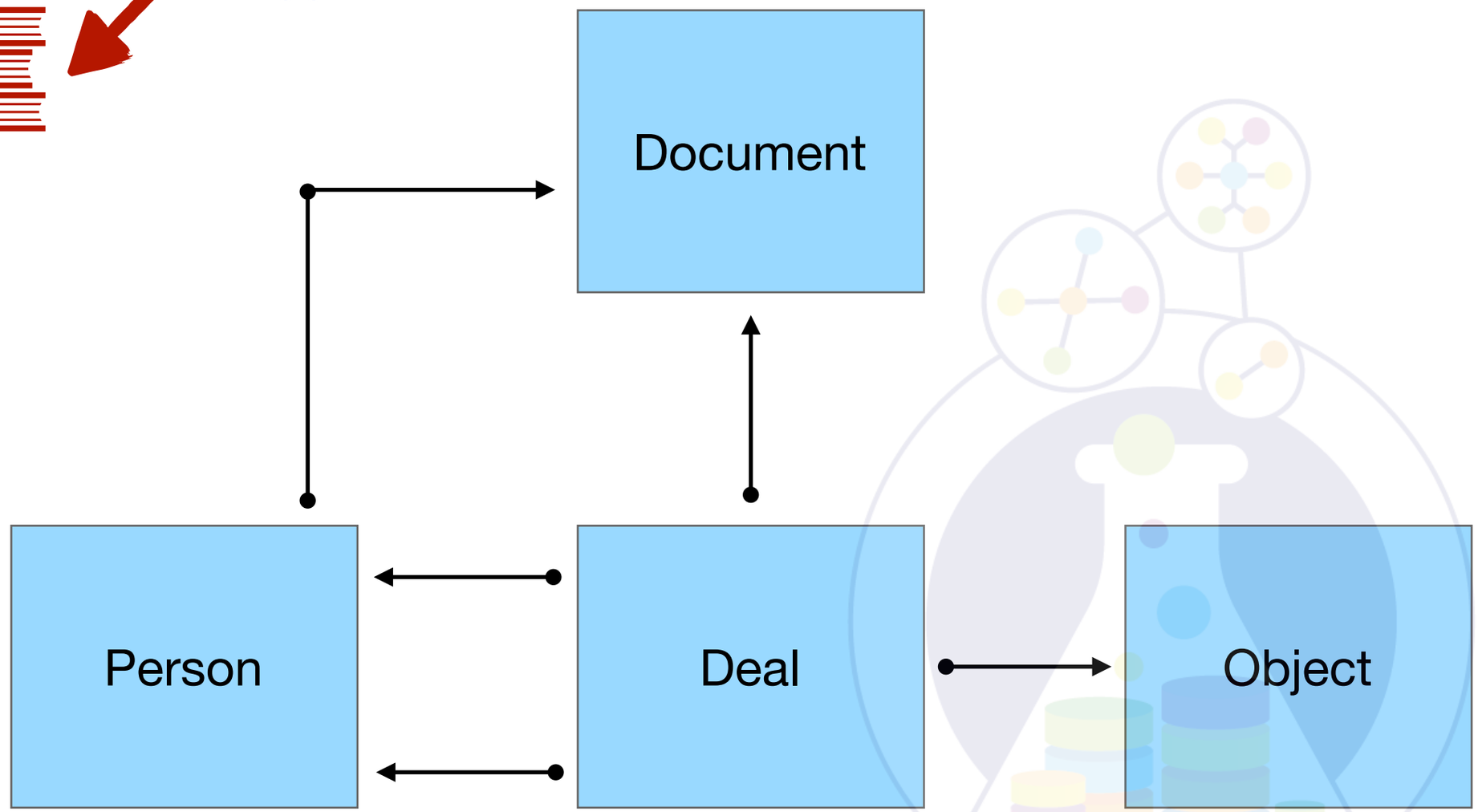




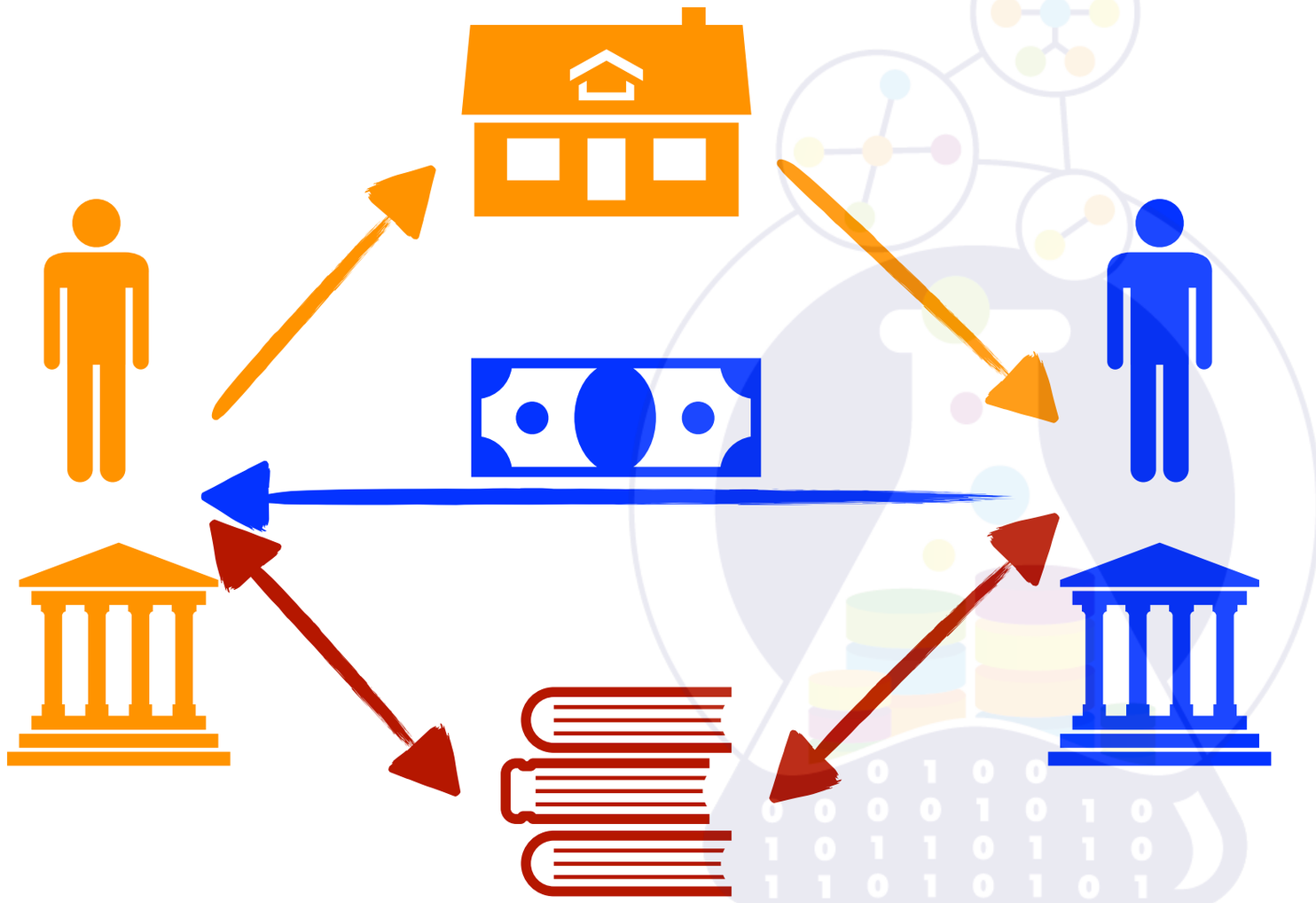


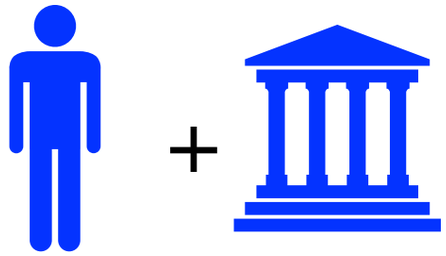






It’s good not my friend! I waiting am organisation too!





+

Entity

Name

INN

Birthday

Address

Phone

Email

is a

Person

Surname

Lastname

Gender

SNILS

Birthplace

is a

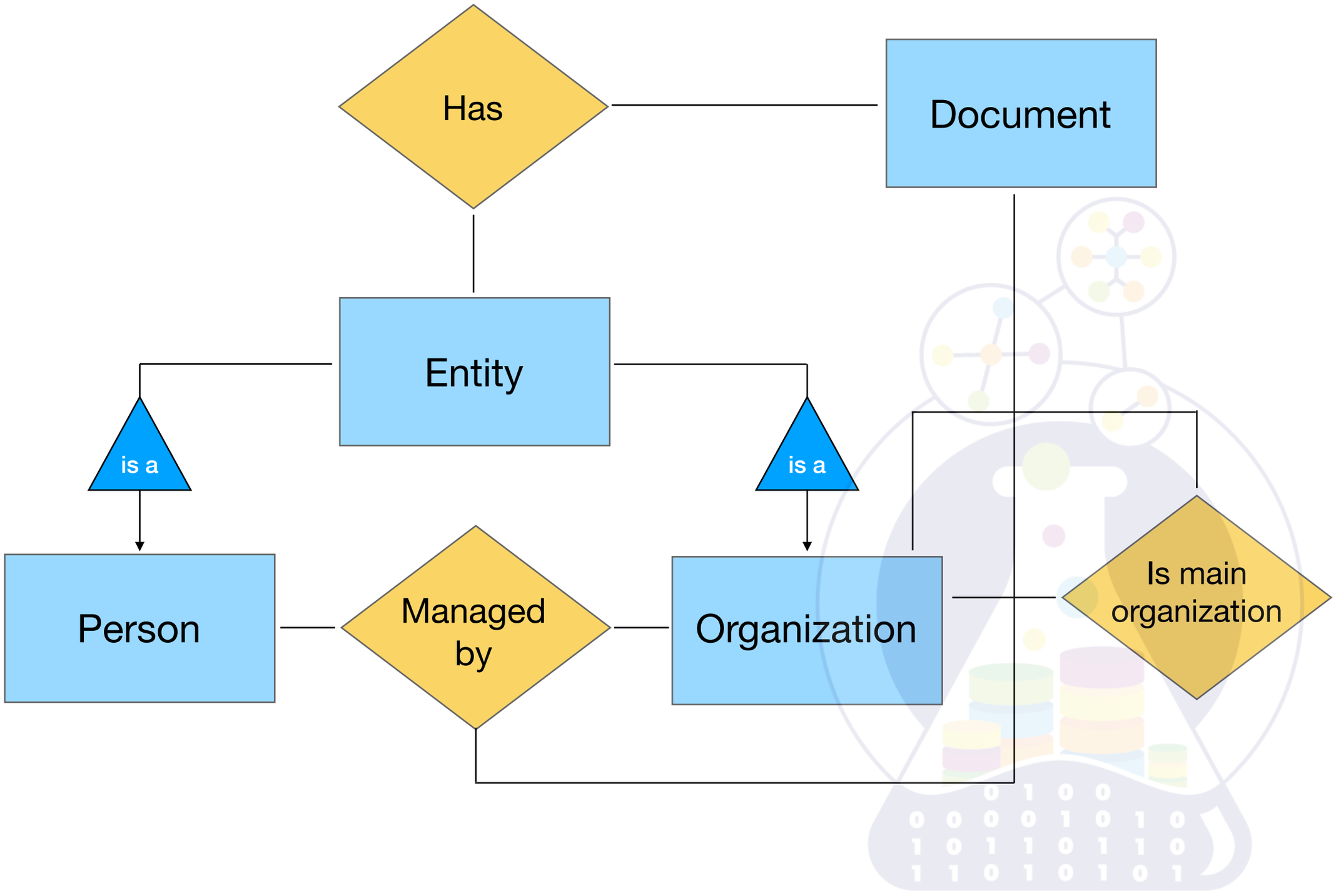
Organization

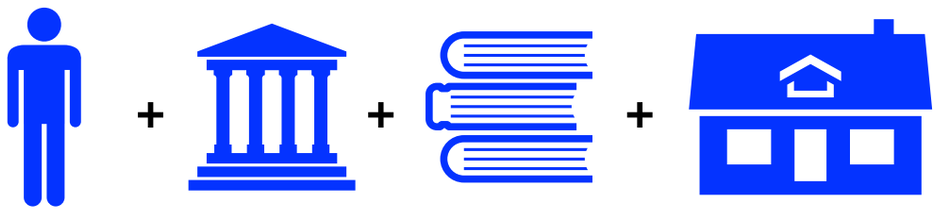
KPP

Organization Type

Main Organization

Director





Has

Document

Has

Entity

Object

is a

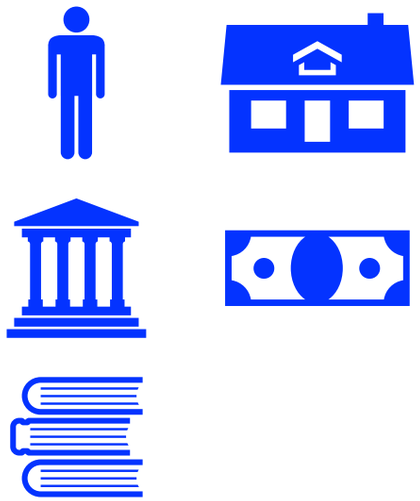
is a

Person

Managed by

Organization

Is main organization



Has

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Document

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Object

Entity

is a

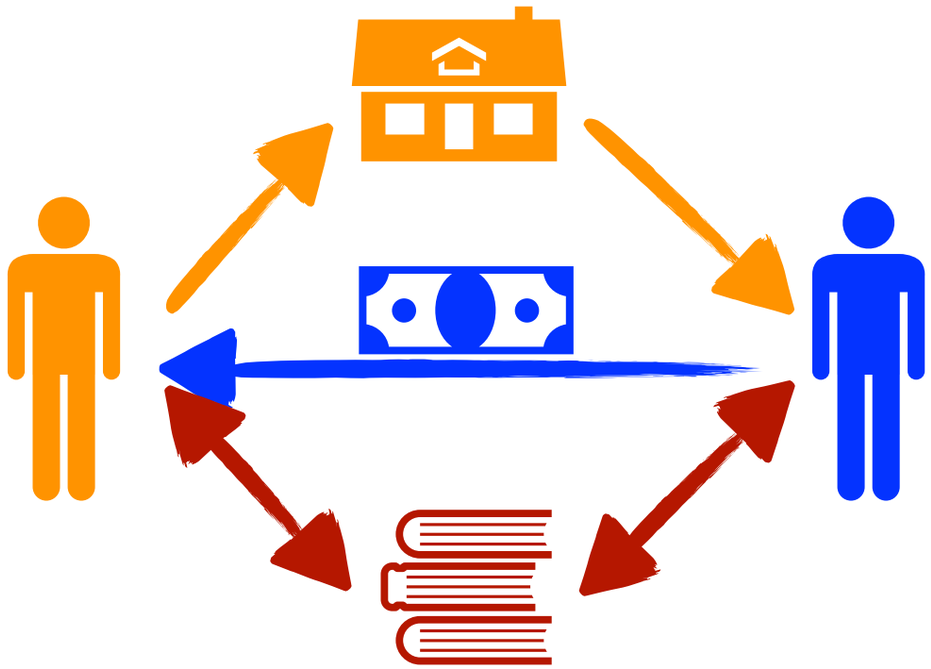
is a

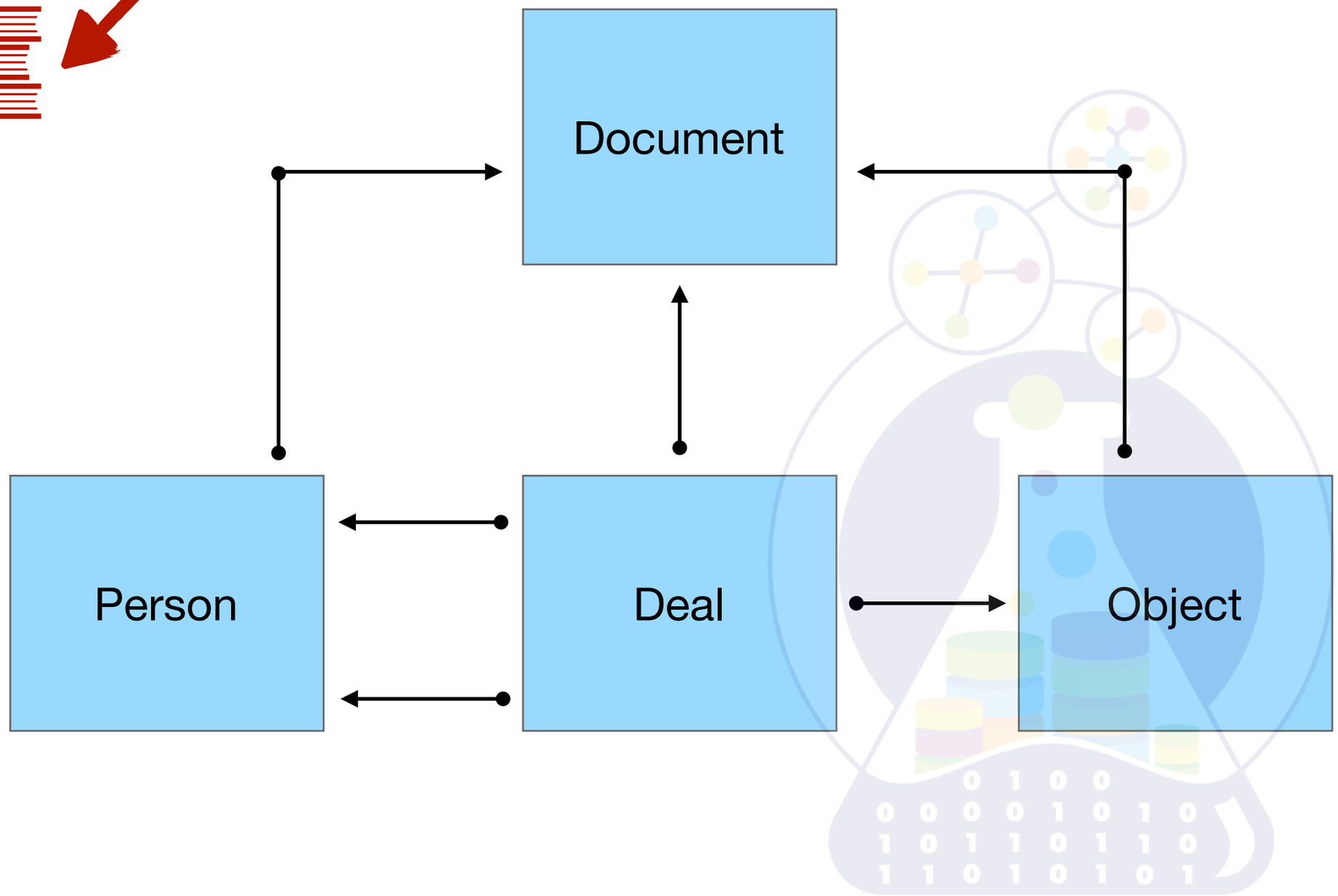
Person

Managed by

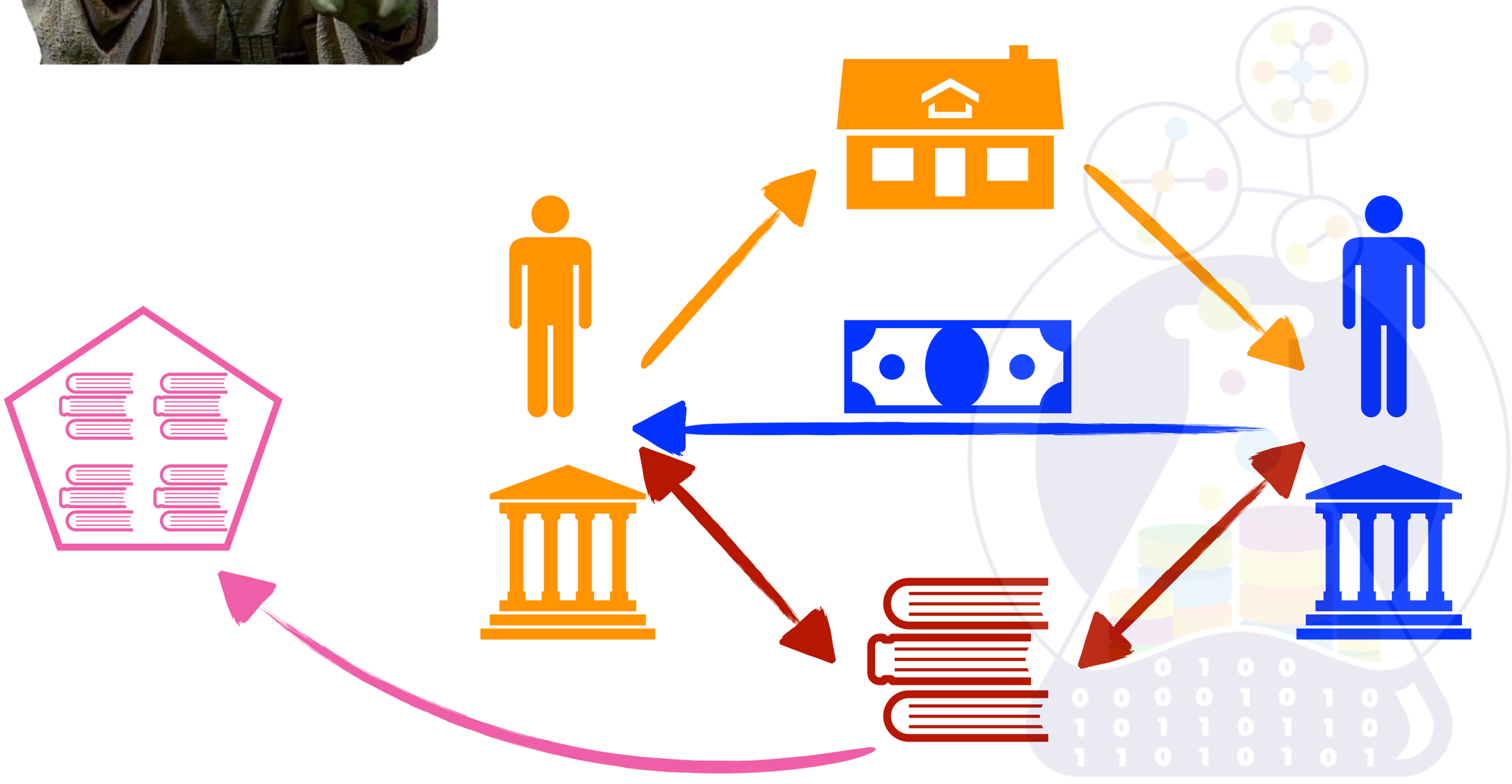
Organization

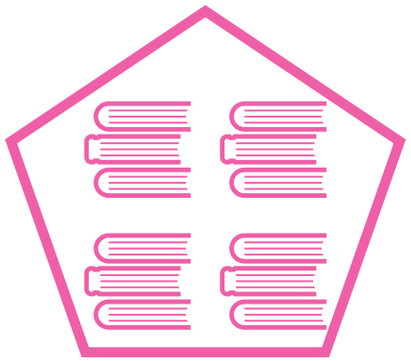
Is main organization

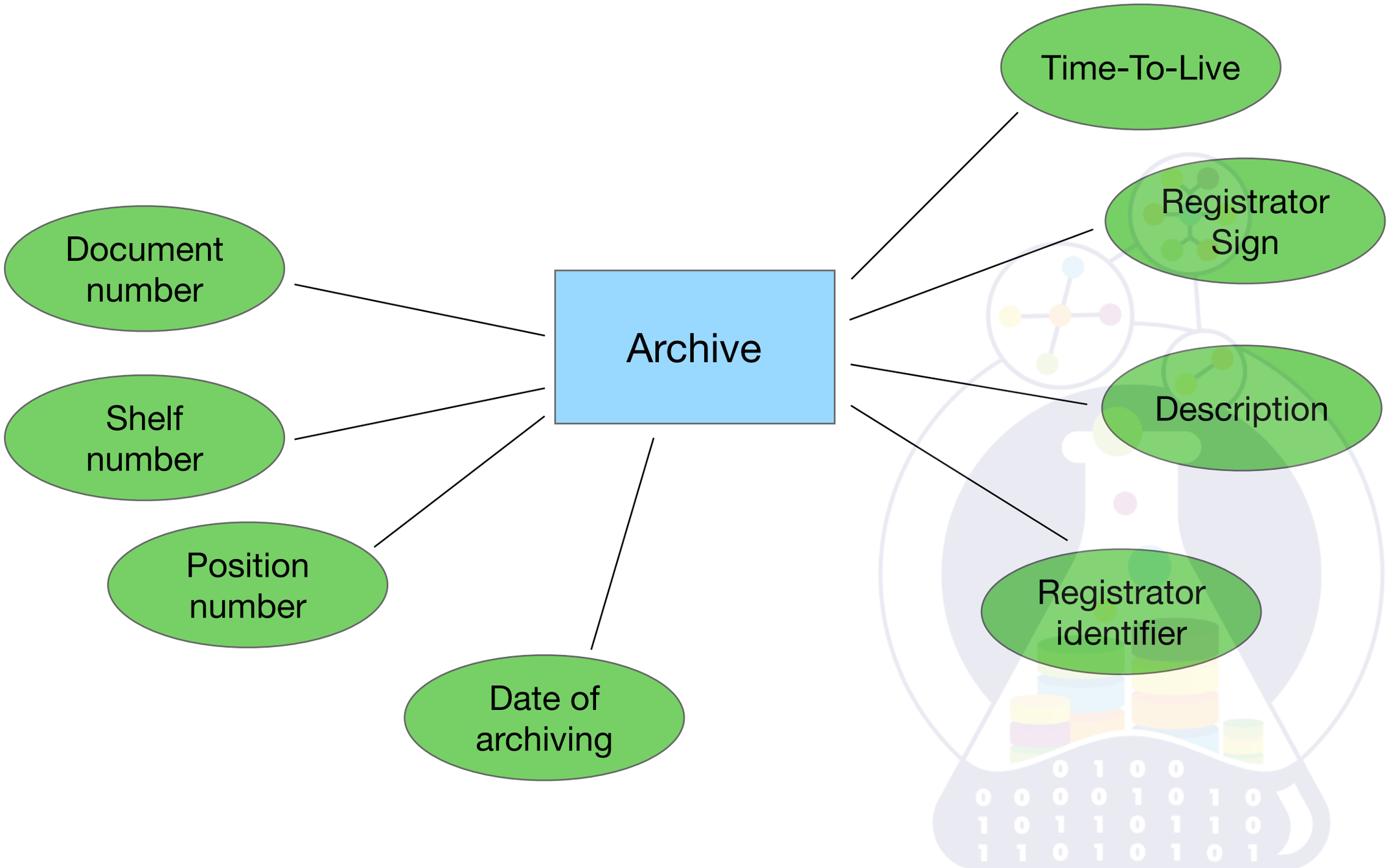


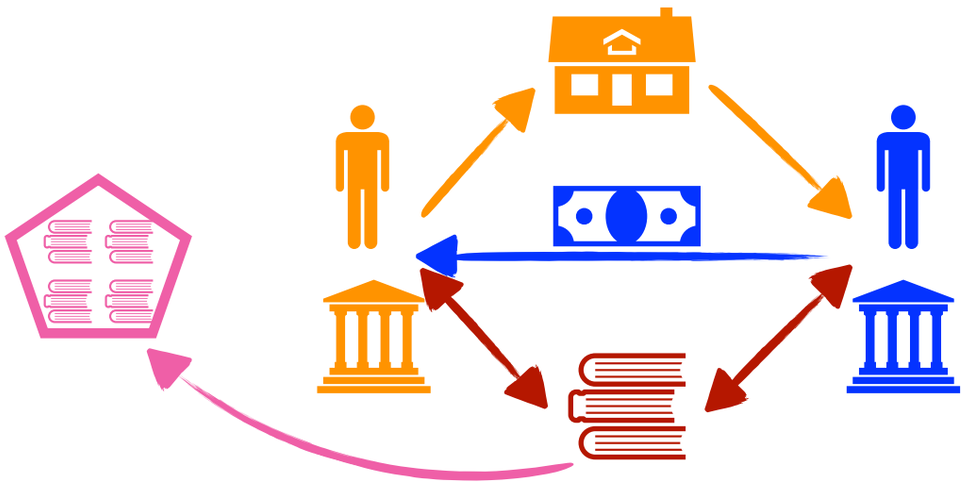


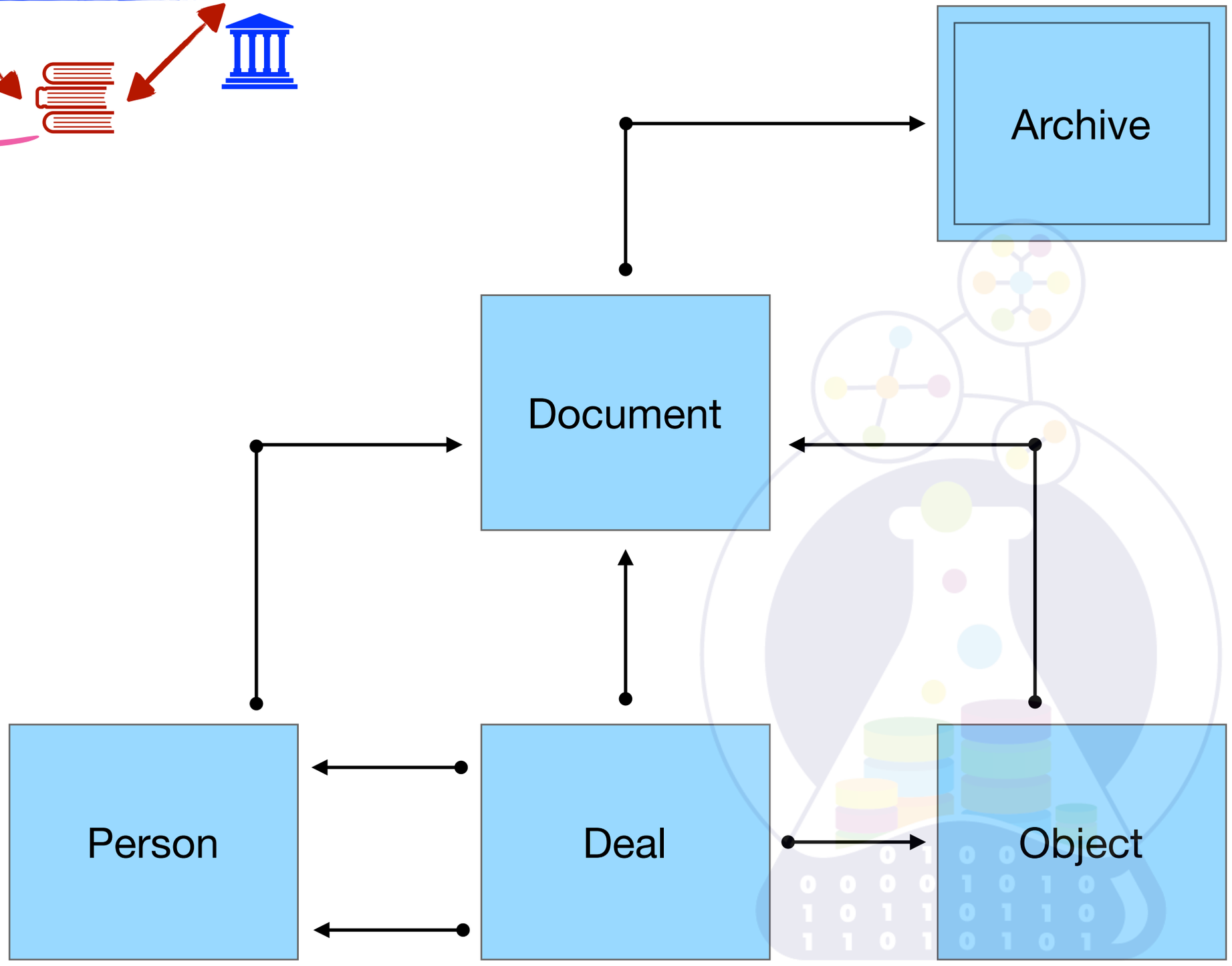
Done well!
We need an Archive for documents!



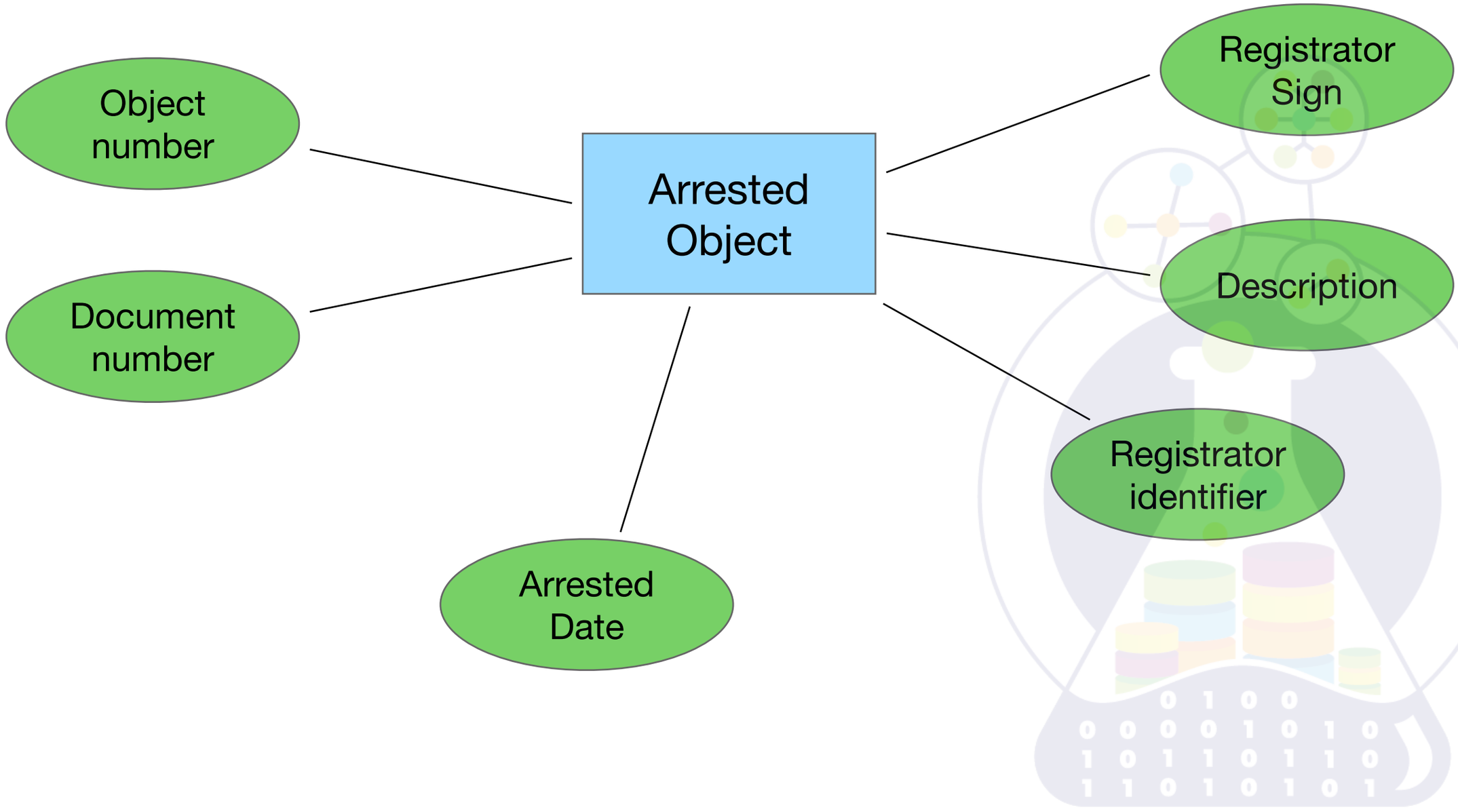


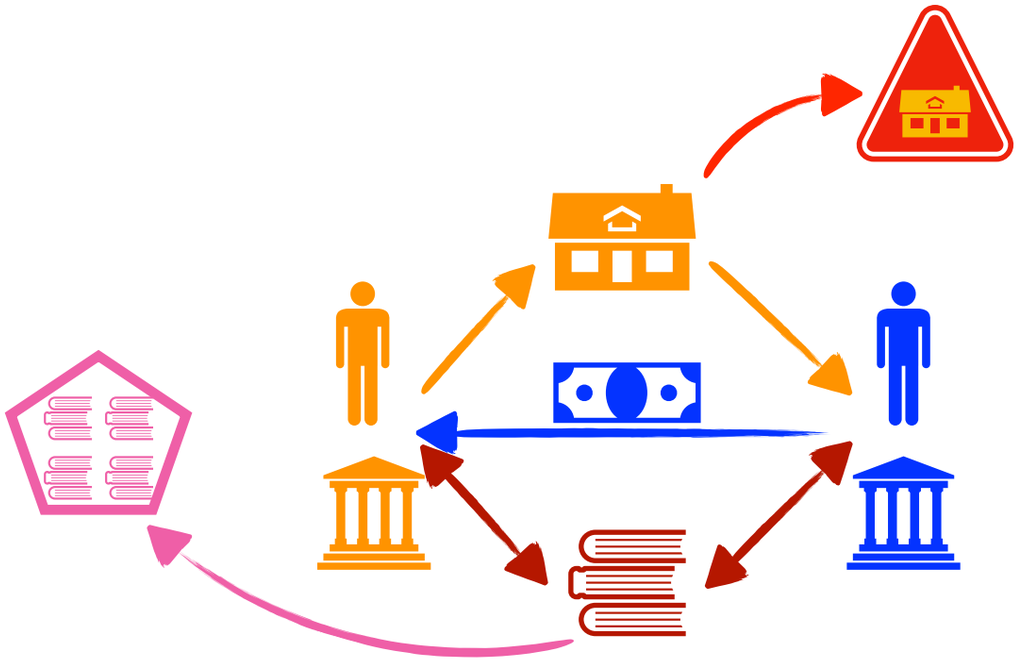


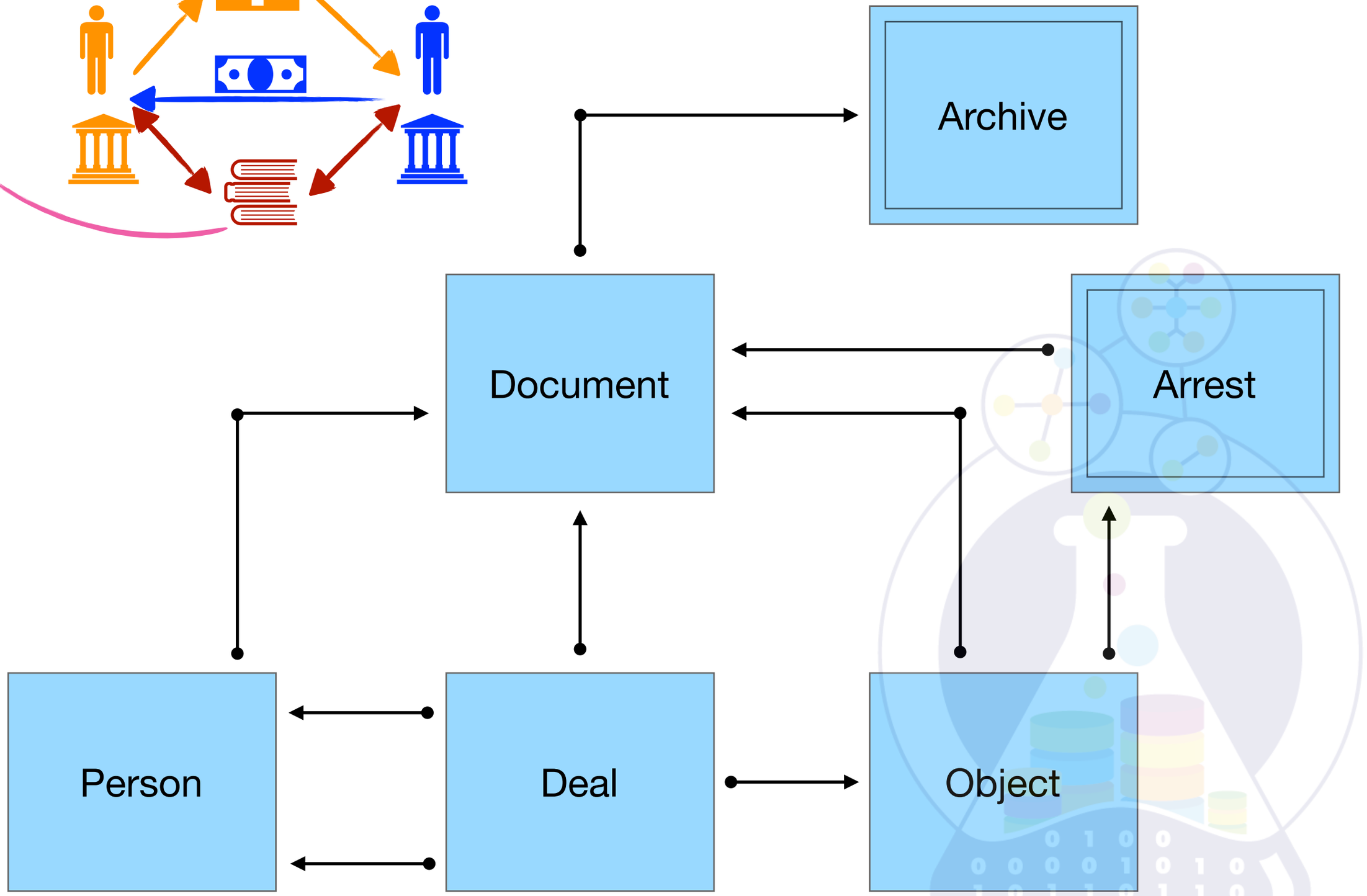




Well done Jedi!
We should arrested objects register!







Archive

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Deal

Store in

Has

Has

Has

Has

Document

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Arrest

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Entity

Object

is a

is a

Person

Managed by

Organization

Is main organization

COMMIT;

Azat Yakupov