Databases Homework 1

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Domain: Technology transfer, 42

Step 1: Requirements elicitation

Technology transfer – is a **process** of transferring or trading technology (could be any category) from the owner organization that owns or holds this technology to another receiver organization in attempt to make inventions, scientific outcomes and services in order to get new products that benefit society.

Input: description of the concept of technology transfer and its main aspects

Technology transfer:

- transferID – ID of the transfer of technology
- transferDate – date of transfer
- transferMethod – transferring method
- transferPurpose – for what needs this technology will be transferred
- transferTerms – condition and approval of transferring
- technologyID – ID of the technology
- technologyCategory – category of the technology (biological technology, informational technology, military technology, etc.)

- technologyName – name of the technology
- technologyDescription – description of the technology
- ownerOrganizationID – ID of the organization which owns or holds technology
- ownerOrganizationPhone – phone of the owner's organization
- ownerOrganizationAddress – address of the owner's organization
- ownerOrganizationName – name of the owner's organization
- receiverOrganizationID – ID of the organization which receives technology
- receiverOrganizationPhone – phone of the receiver's organization
- receiverOrganizationAddress – address of the receiver's organization
- receiverOrganizationName – name of the receiver's organization
- receiverOrganizationReceivedTechnologies – what technologies destination organization received
- licenseNo – number of the technology license which owns organization
- licenseType – type of the license
- licenseStatement – license's text
- collaborationDocumentID – ID of the collaboration document
- collaborationDocumentText – text of the collaboration document, what about it states
- collaborationPeriod – time period of collaboration
- collaborationType – type of the collaboration
- collaborationBenefit – what benefit organizations earns from collaborating and transferring technology
- productID – ID of the product
- productName – name of the product
- productDescription – description of the product
- productValue – what value brings product to society

Technology transfer:

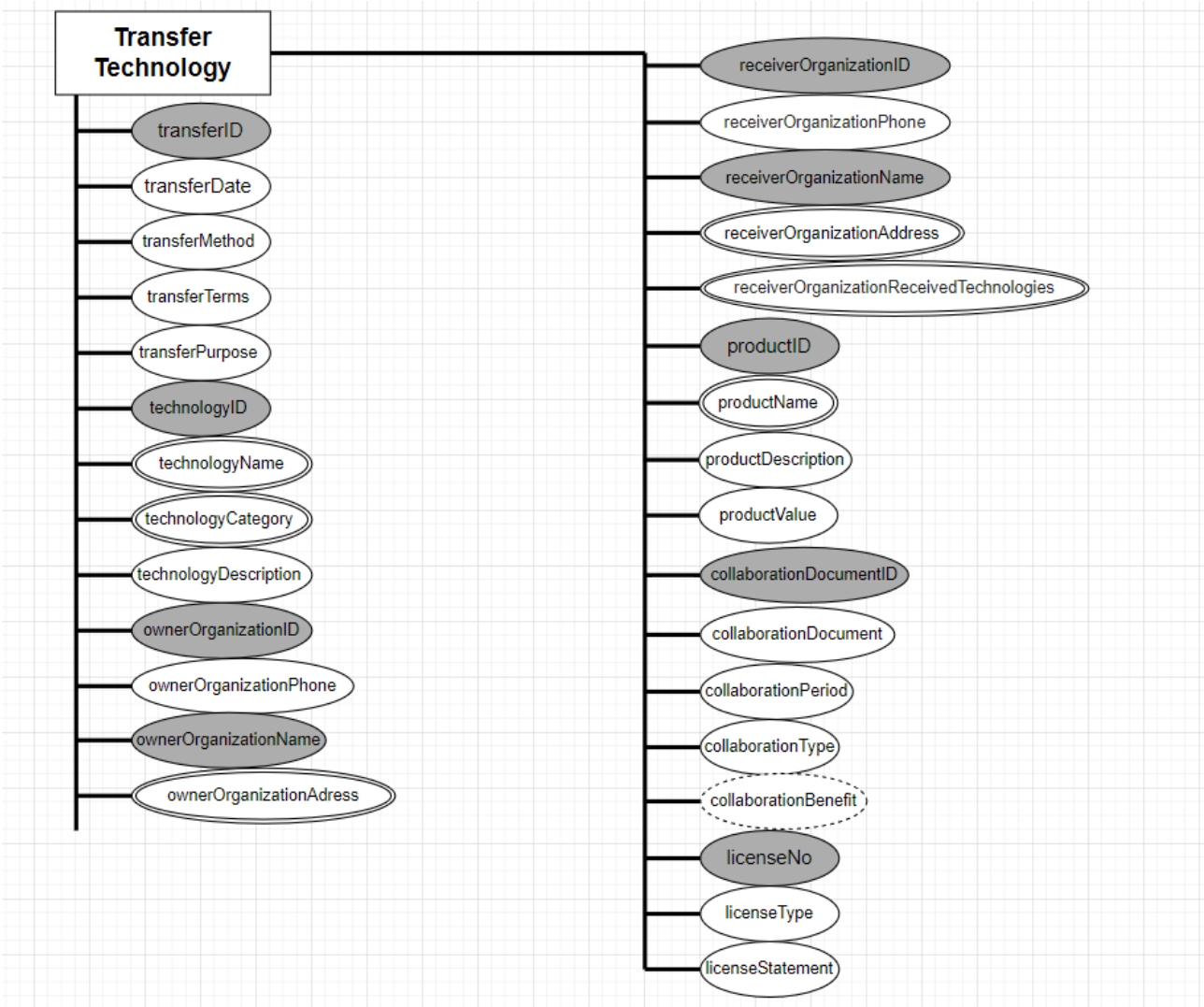
- Used for transferring knowledge, technology
- Aims to create value through the exchange of knowledge and technology
- Involves different stakeholders, including technology owners
- Has different methods (selling, licensing, collaboration)
- Facilitates for collaboration and/or further development of the technology

Output: list of the attributes in general for technology transfer and its components

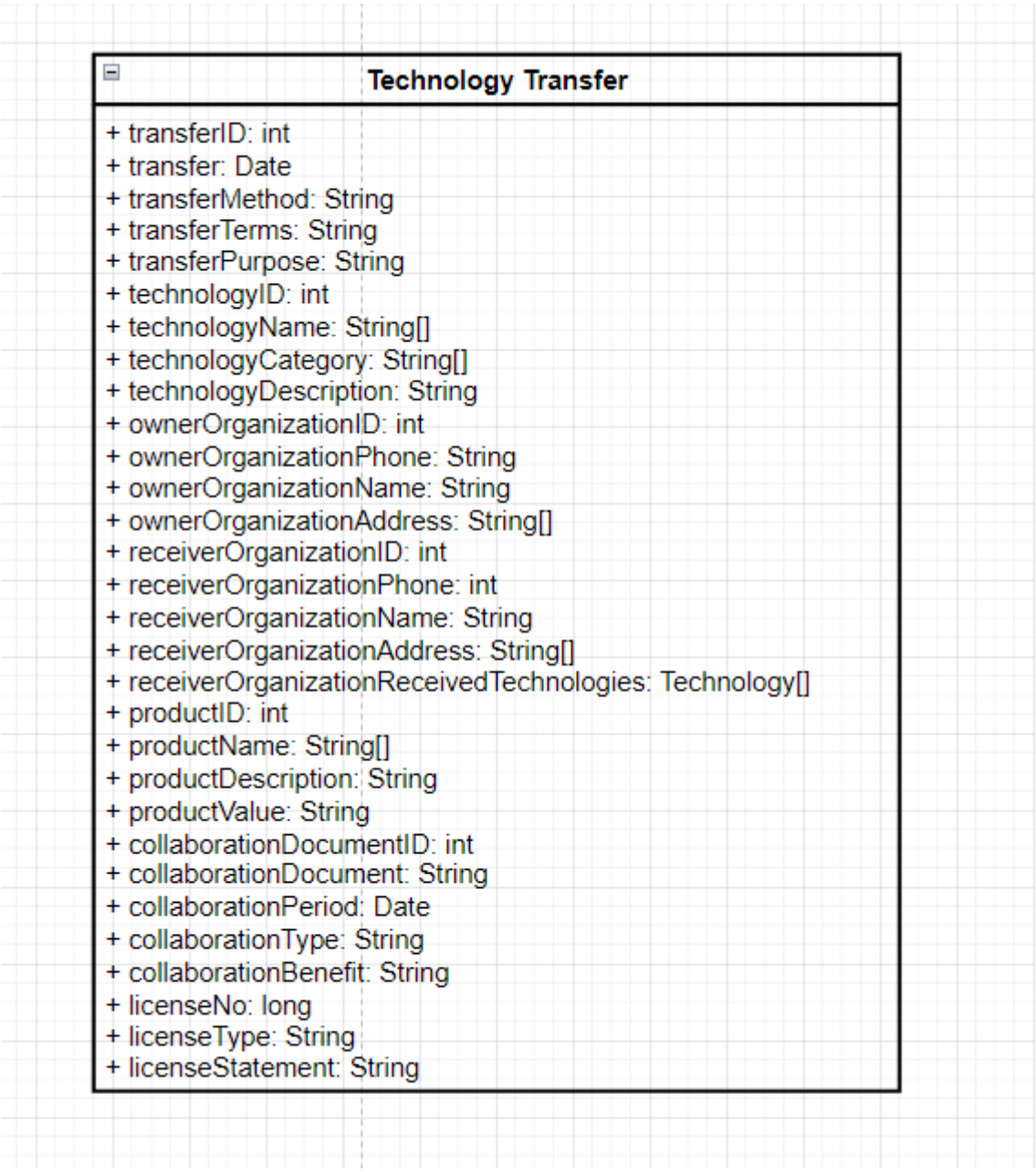
Step 2: Primary Entity Type and its attributes

Input: list of attributes from step 1, its description and properties

ER diagram



UML diagram



Central Entity Type is **Technology Transfer**

Candidate keys:

transferID – can identify process of transferring by its ID

technologyID – can identify technology by its ID

ownerOrganizationID – can find and contact owner organization by its ID

ownerOrganizationName – can find and contact owner organization by its name

receiverOrganizationID – can find and contact destination organization by its ID

receiverOrganizationName – can find and contact destination organization by its name

collaborationDocumentID – organization can find it by ID and recheck if needed

licenseNo – organization has a unique license about technology and this license can be find by its number

productID – products may have different names but we can identify product by its ID

Multi-valued attributes:

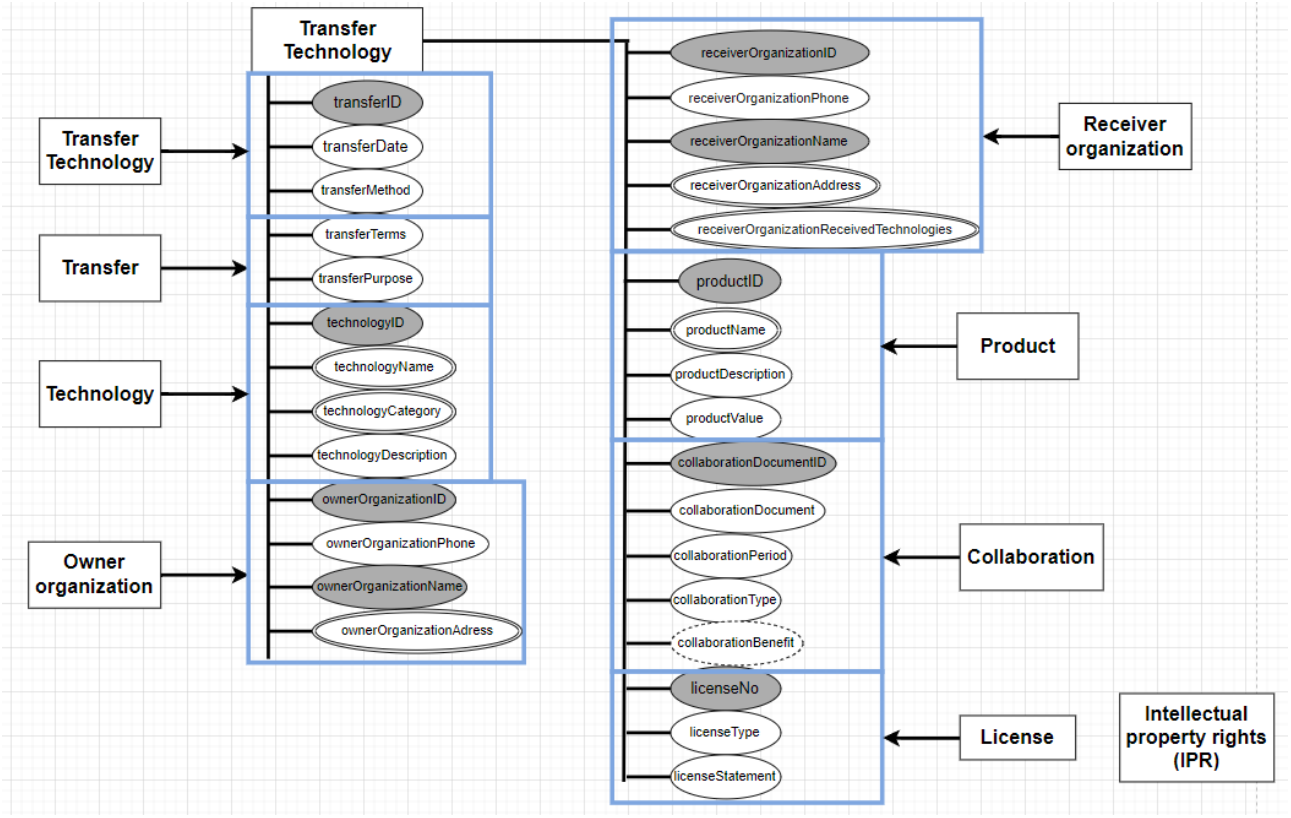
technologyName, technologyCategory, ownerOrganizationAddress, receiverOrganizationAddress, receiverOrganizationReceivedTechnologies, productName – can all be lists

Output: defined central entity type and its attributes, defined possible primary keys and made base diagrams

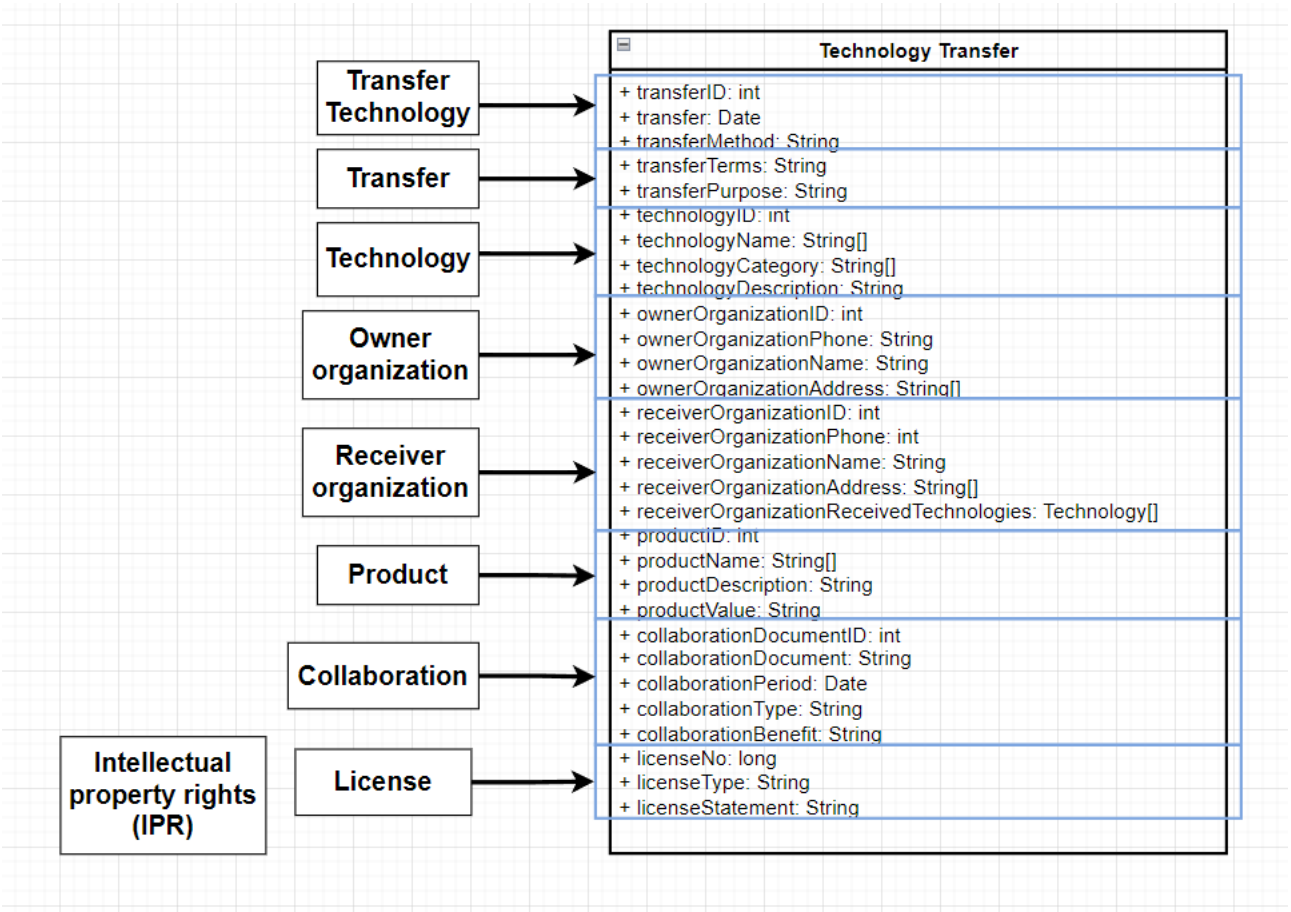
Step 3: Defining more entity types

Input: results from step 2 (base diagrams)

ER diagram



UML diagram

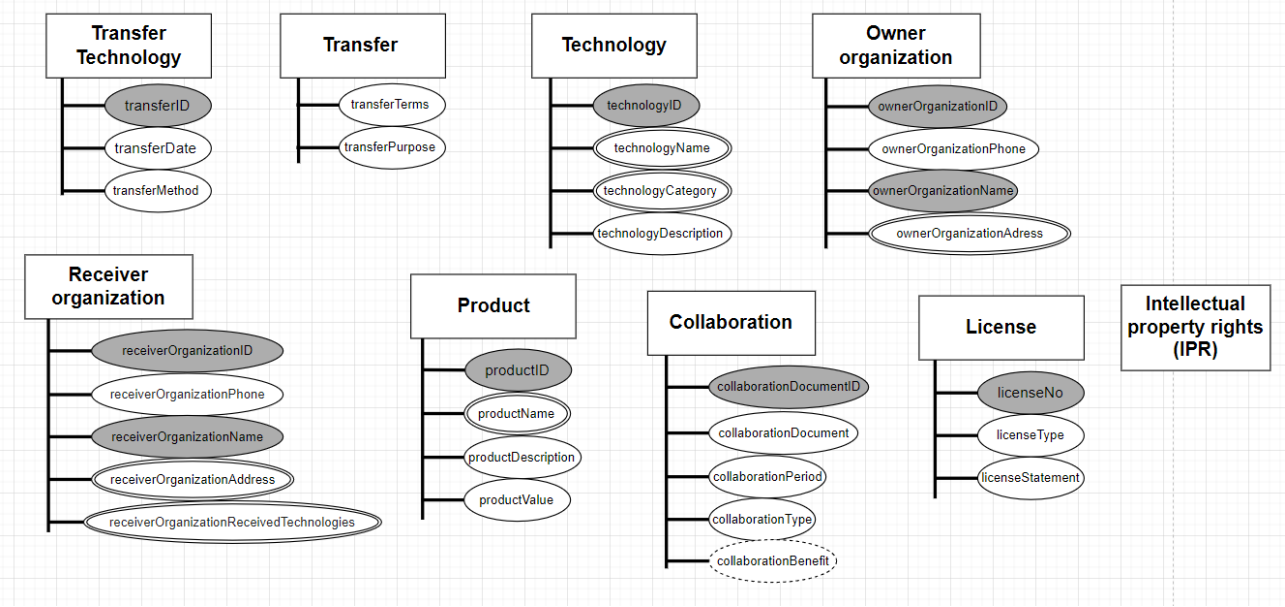


Output: divided central entity type on several entity types based on their similarities

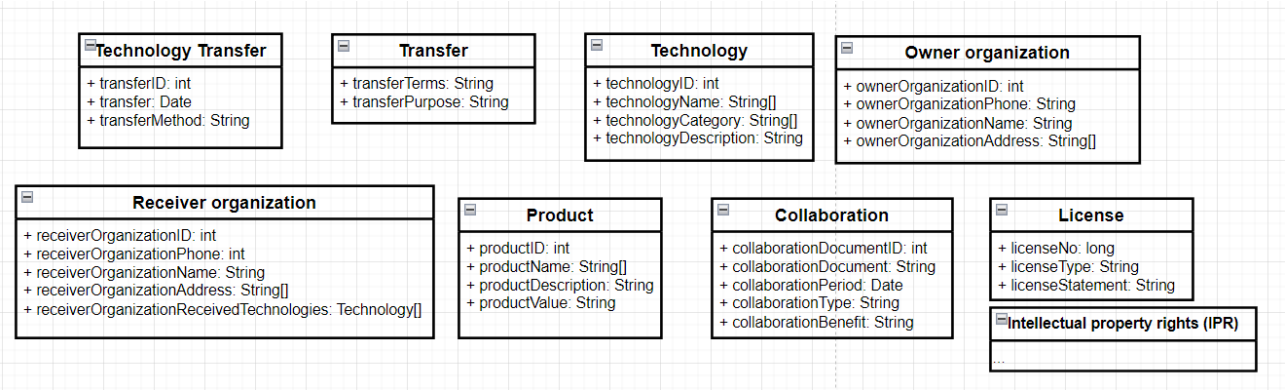
Step 4: Distributing attributes

Input: result from step 4 (divided entity types)

ER diagram



UML diagram



Output: separately divided entity types with their attributes

Step 5: Specifying basic relationships and primary keys for entity types

Input: results from step 4 (separately divided entity types with their attributes)

We can identify our relationships as follows:

Owner organization – performs transfer, involves in collaboration, develops product

Receiver organization – involves in collaboration, develops product

Transfer – transmits technology to receiver organization

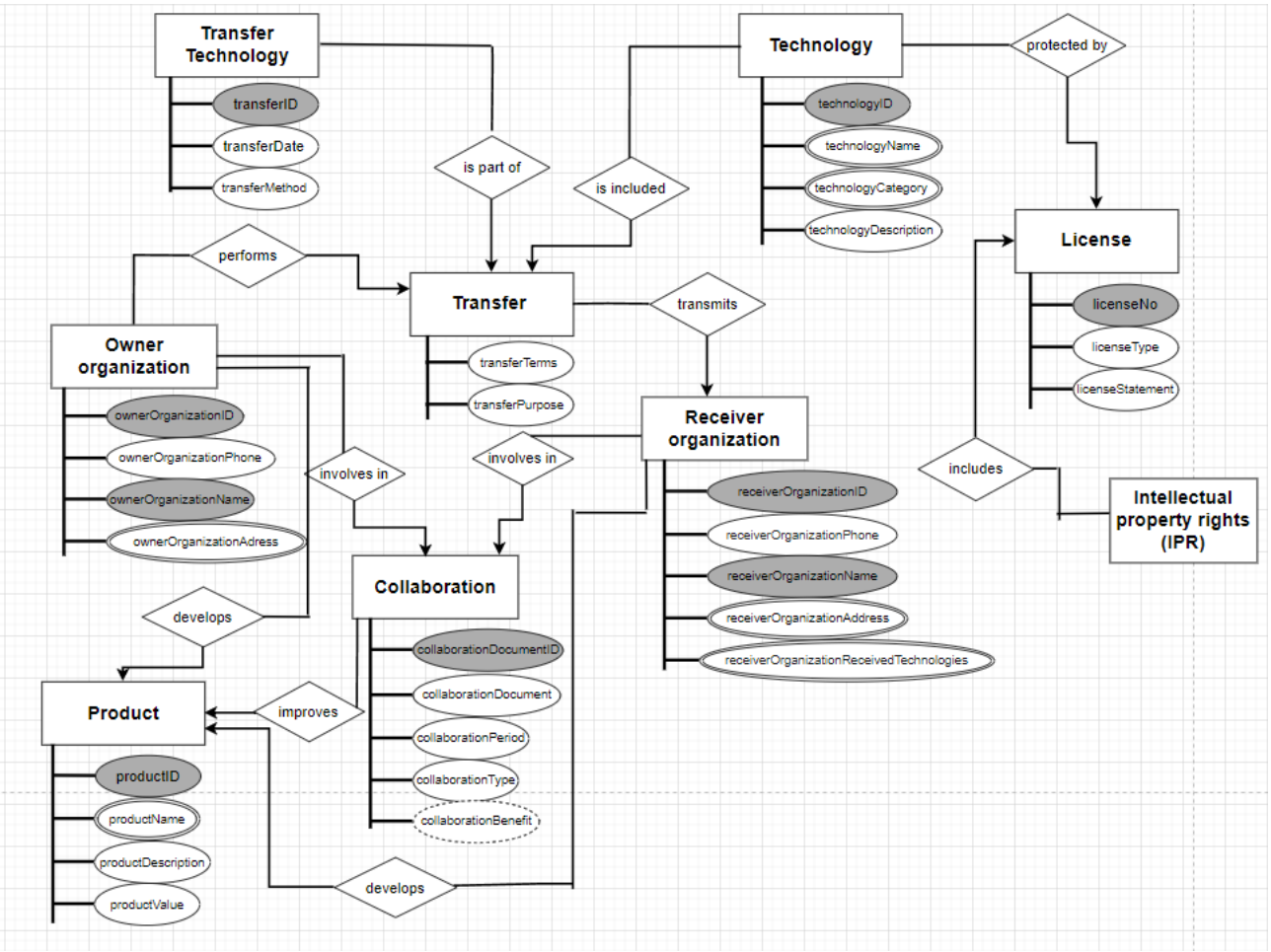
Collaboration – improves product

Technology – is included in transfer, protected by license

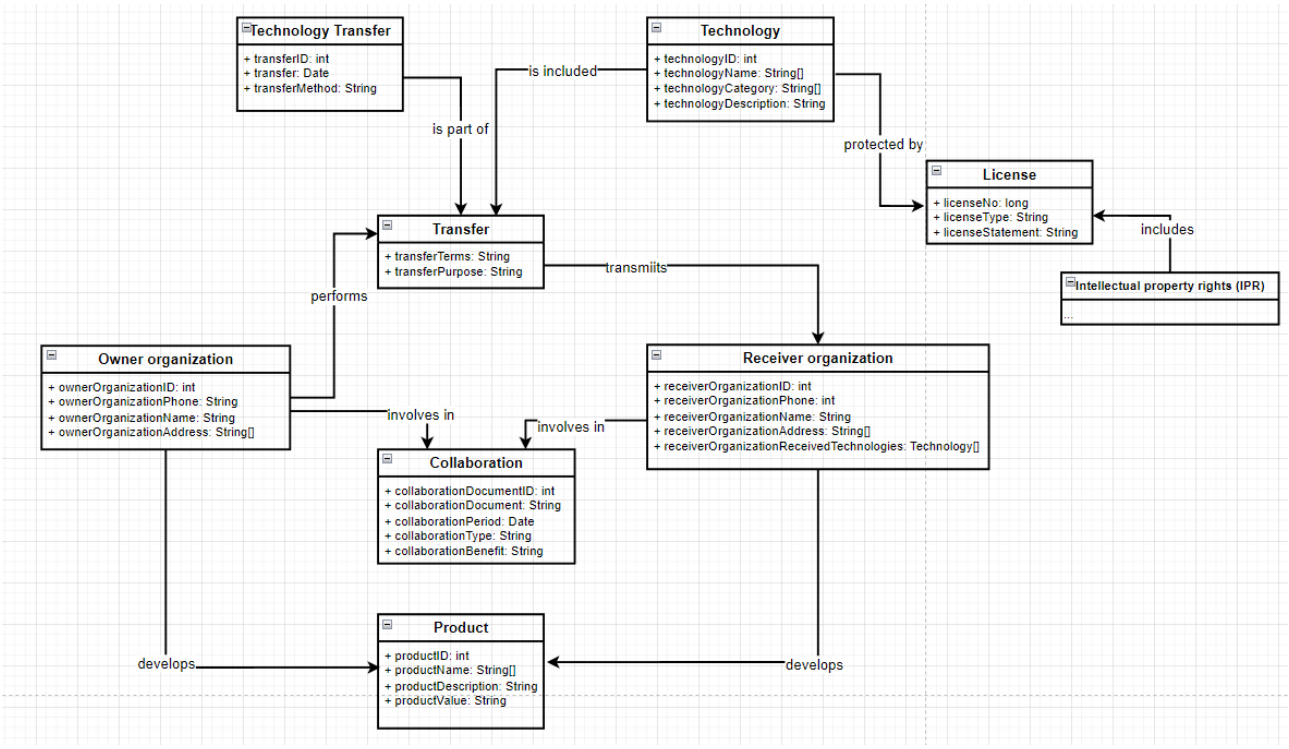
IPR – includes license

Technology Transfer – is part of transfer

ER diagram

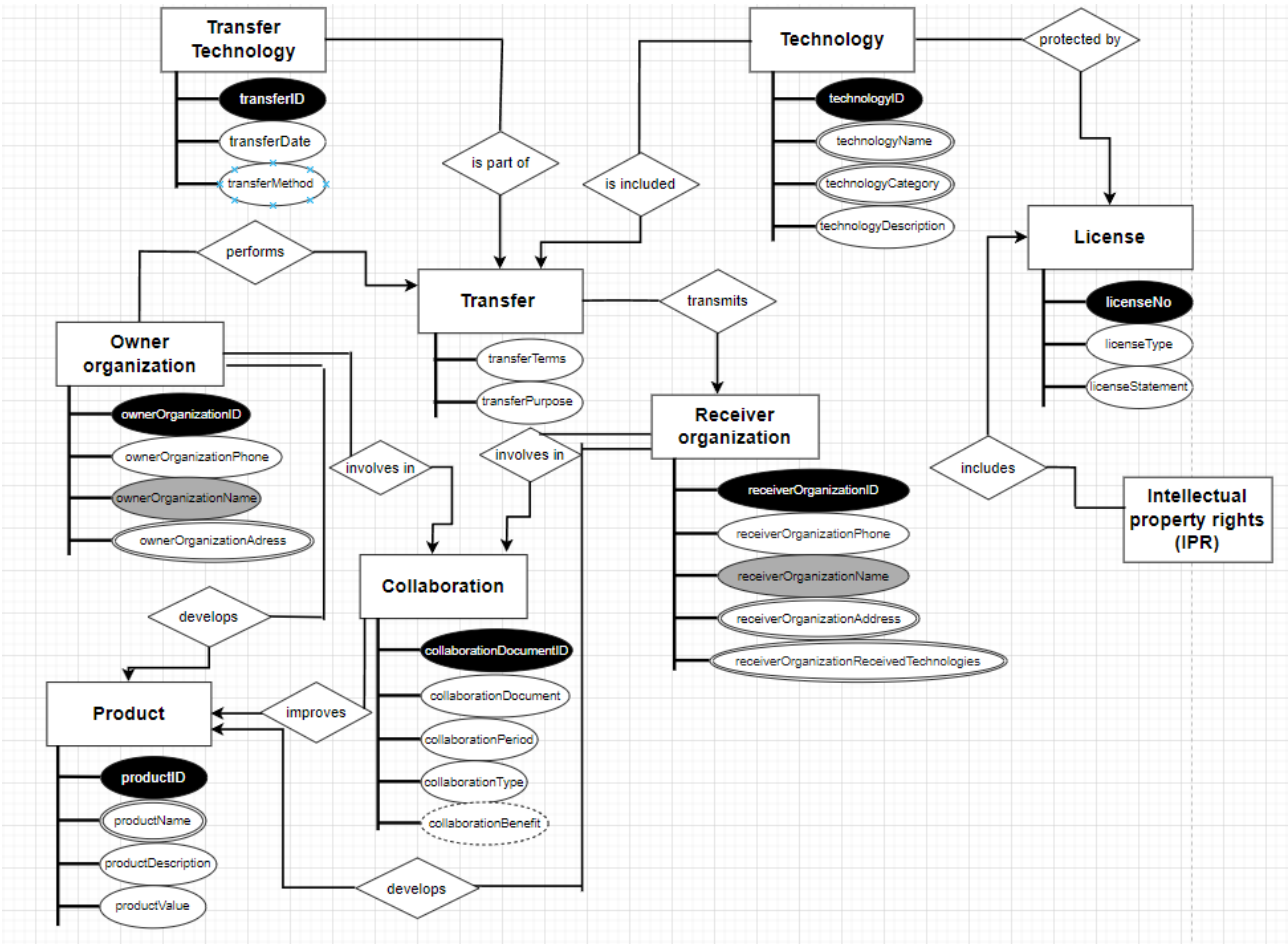


UML diagram

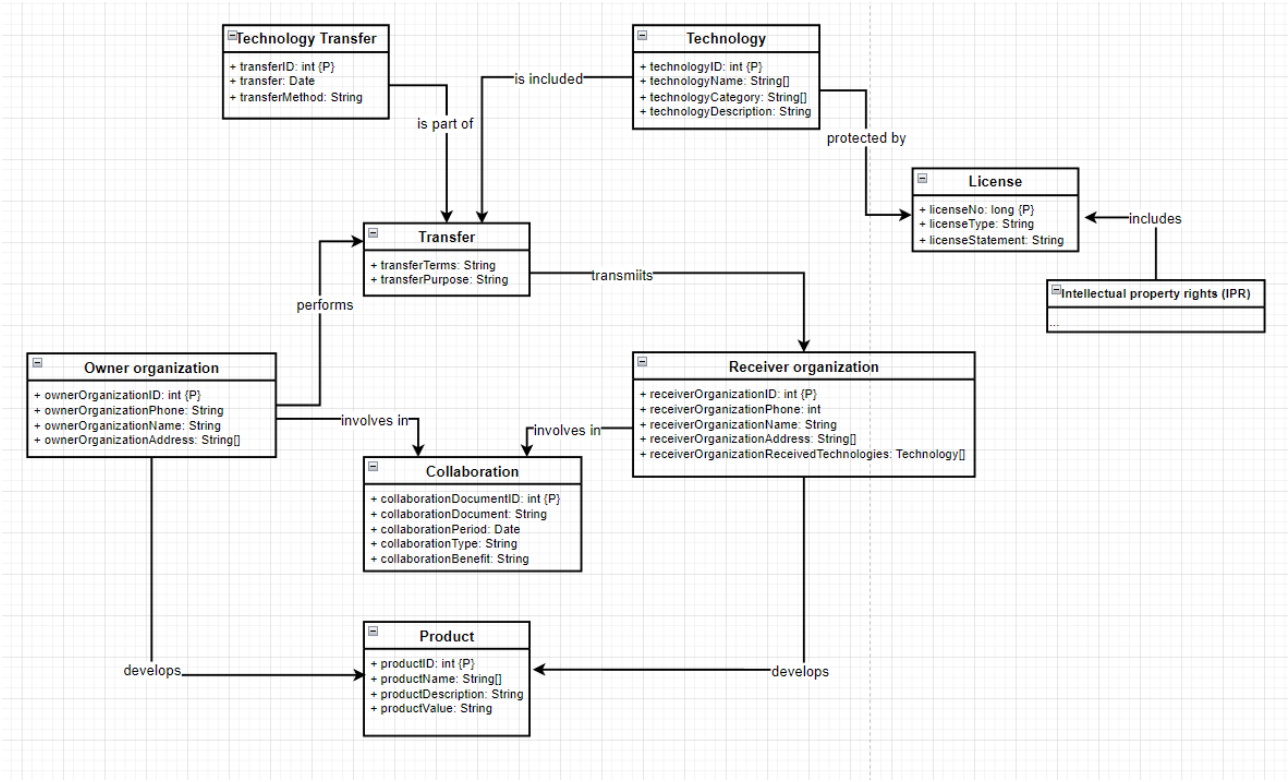


Identifying primary keys in ER diagram (colored in black) and in UML diagram (near attribute wrote {P})

ER diagram



UML diagram



Output: defined primary keys and relationships between entities

Step 6: Specifying foreign keys

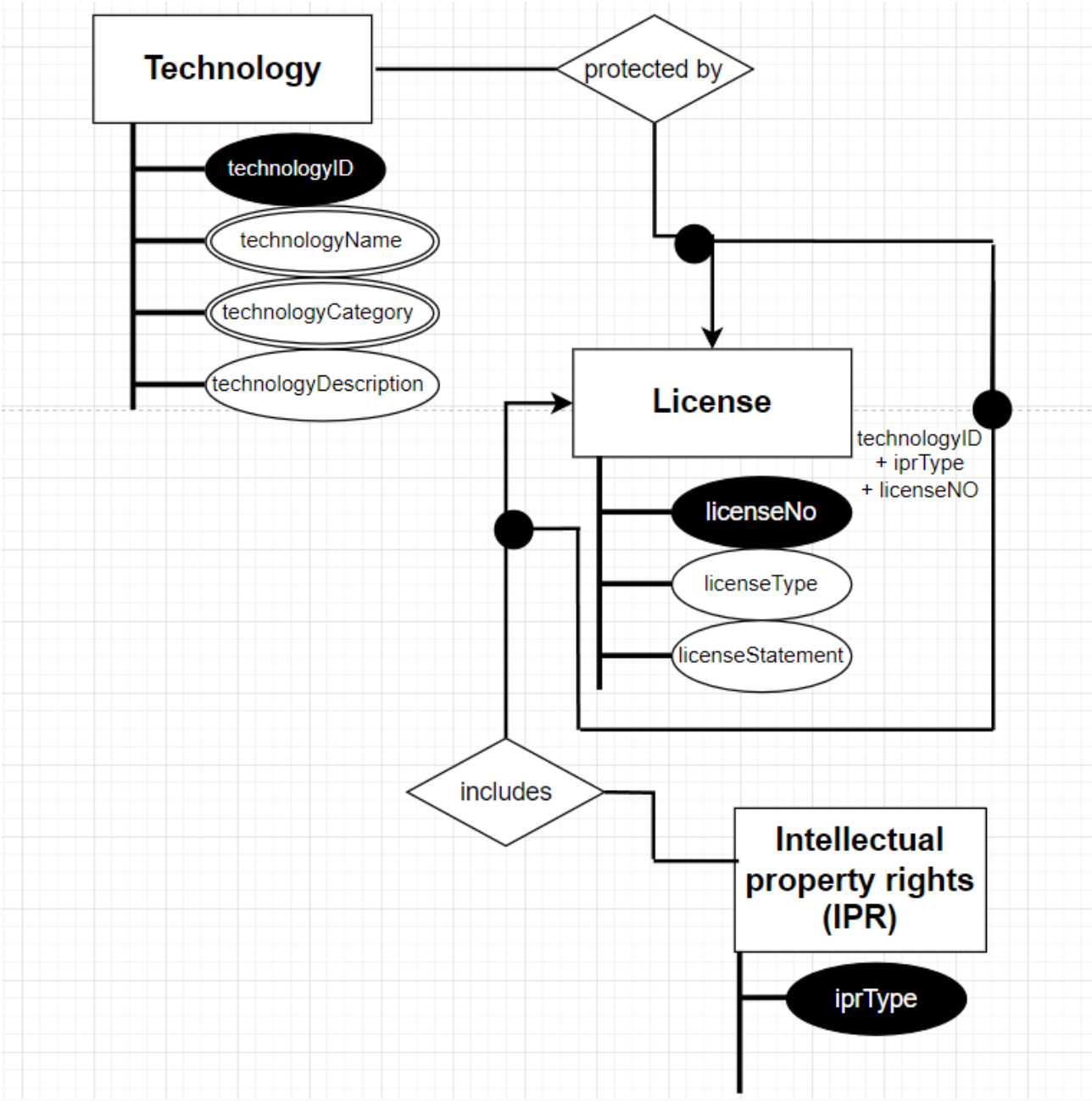
Input: from step 5 (diagrams with relationships between entities and primary keys)

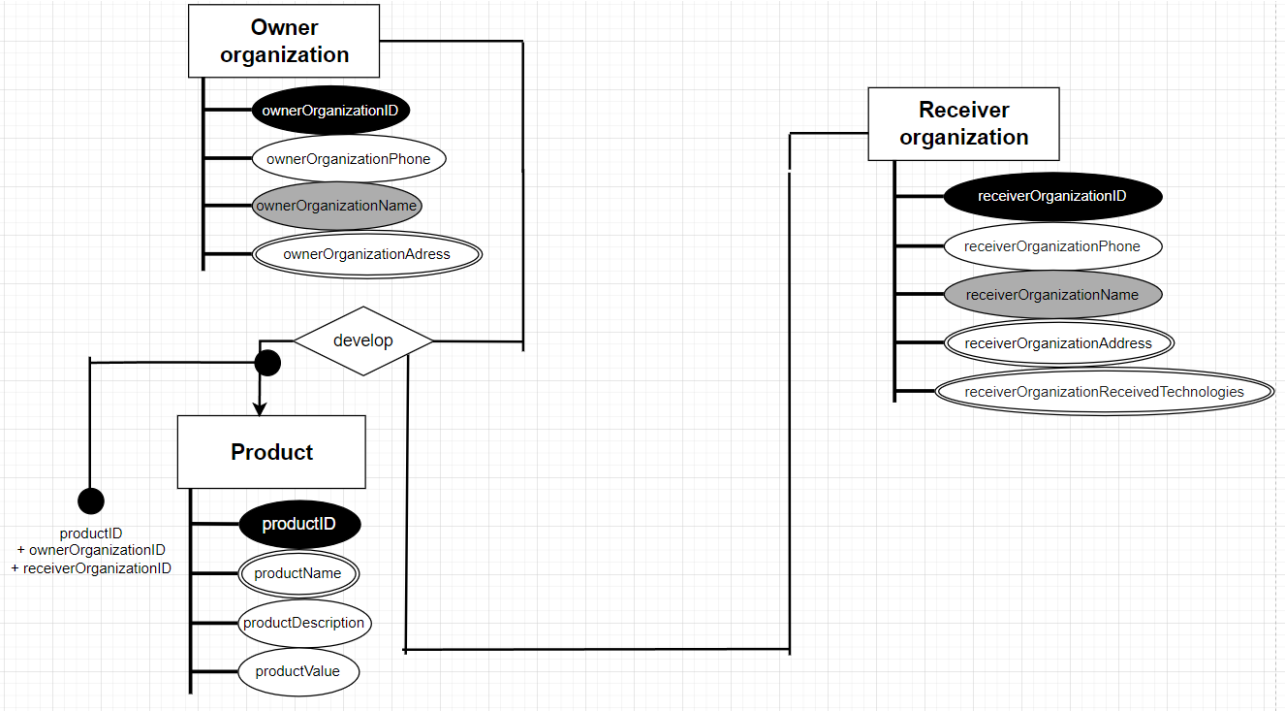
Now we can specify weak entities with foreign keys

Weak entities are:

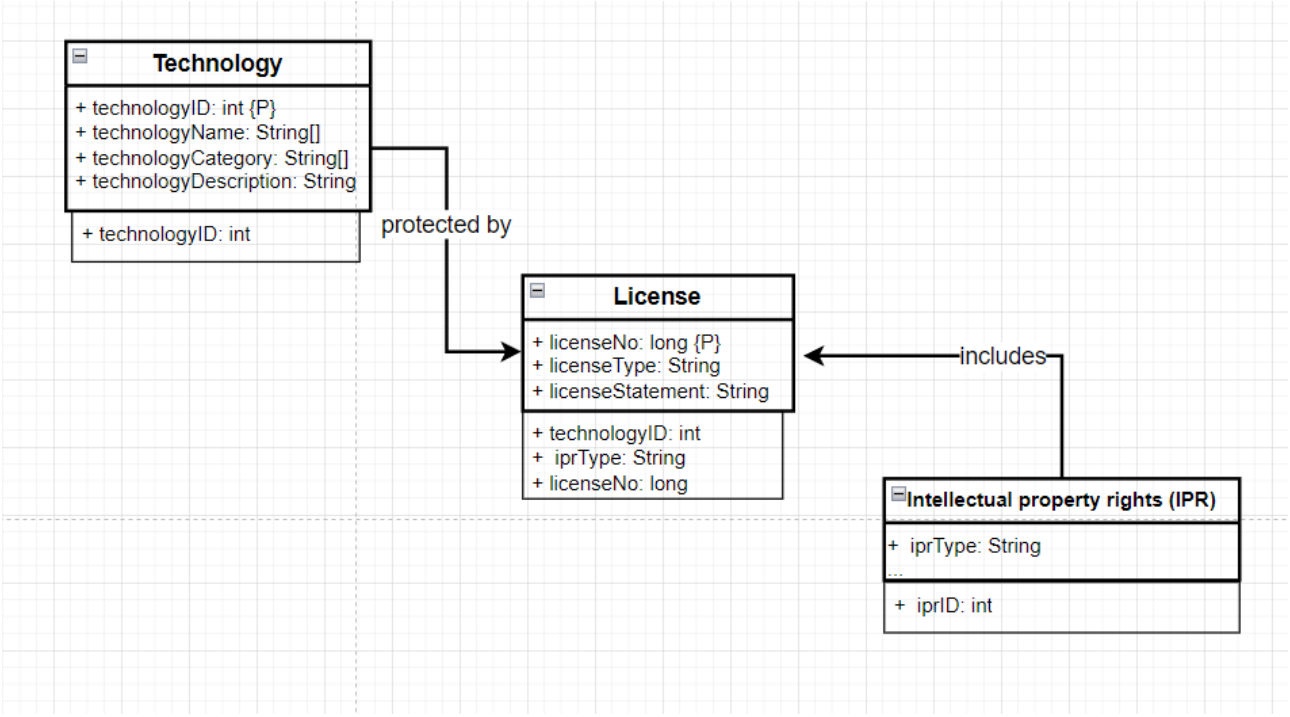
- **License** – cannot exist without technology because it protects it and cannot exist apart from IPR because it is a part of it.
- **Product** – cannot be developed without organizations (no developers – no product)

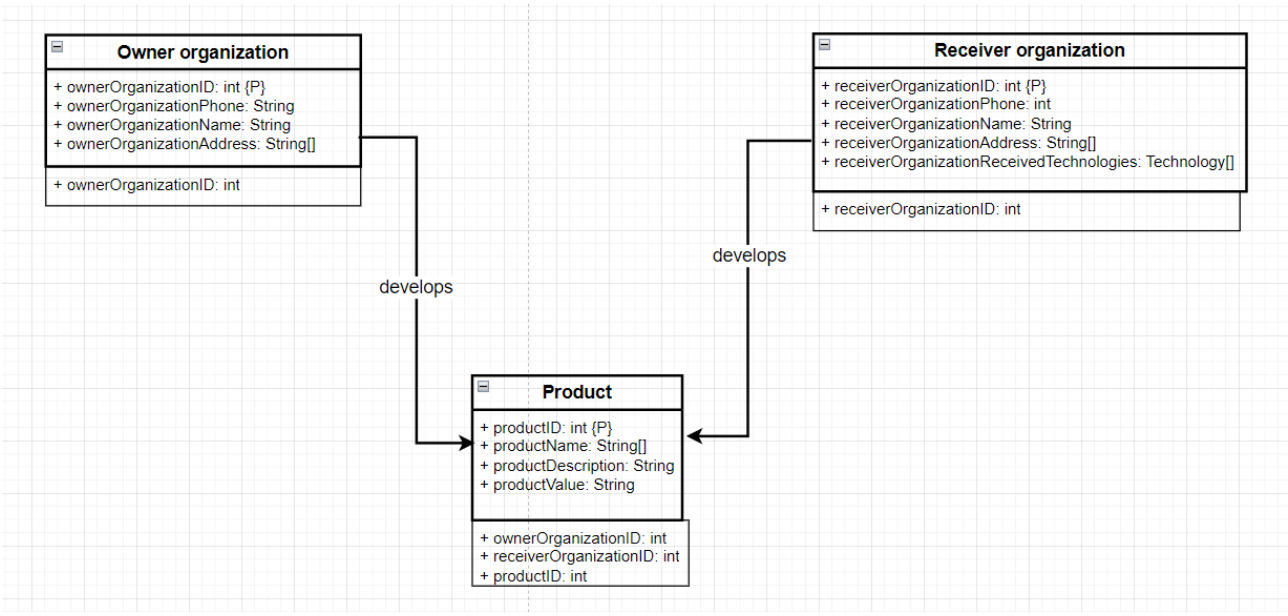
ER diagrams


Technology
protected by
technologyID
technologyName
technologyCategory
technologyDescription
License
technologyID
+ iprType
+ licenseNO
licenseNo
licenseType
licenseStatement
includes
Intellectual property rights (IPR)
iprType



UML diagrams





Output: diagrams with weak and strong entity types and corresponding foreign keys

Step 7: Specifying composites and aggregates

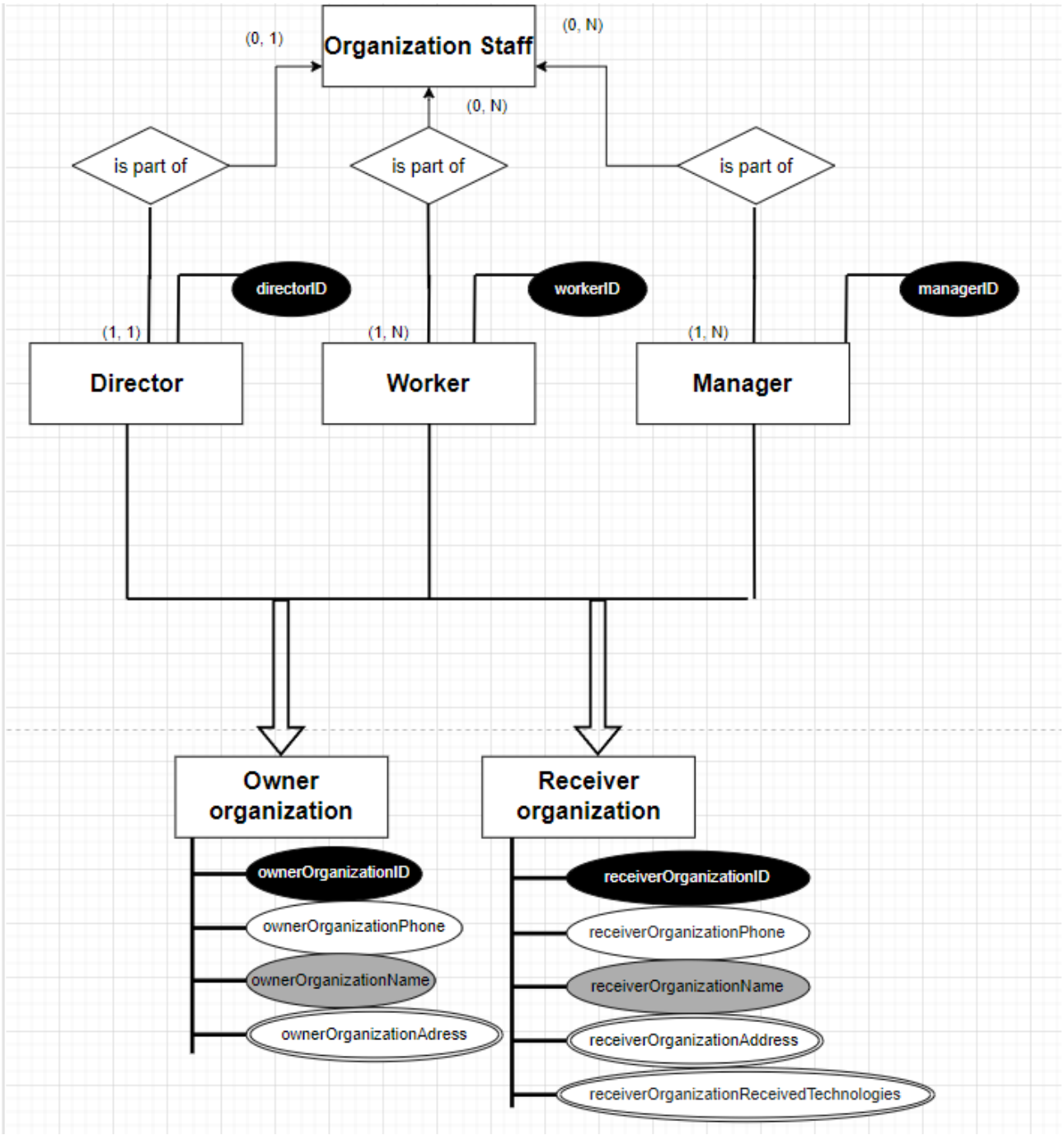
Input: results from previous steps

Composition in ER:

Organizations have different types of employees. For example, director, manager and common worker. And all of them belong to organization staff.

IMPORTANT! On the diagram it means that all three employees works in different organizations (means that the same employee doesn’t work in two organizations simultaneously)

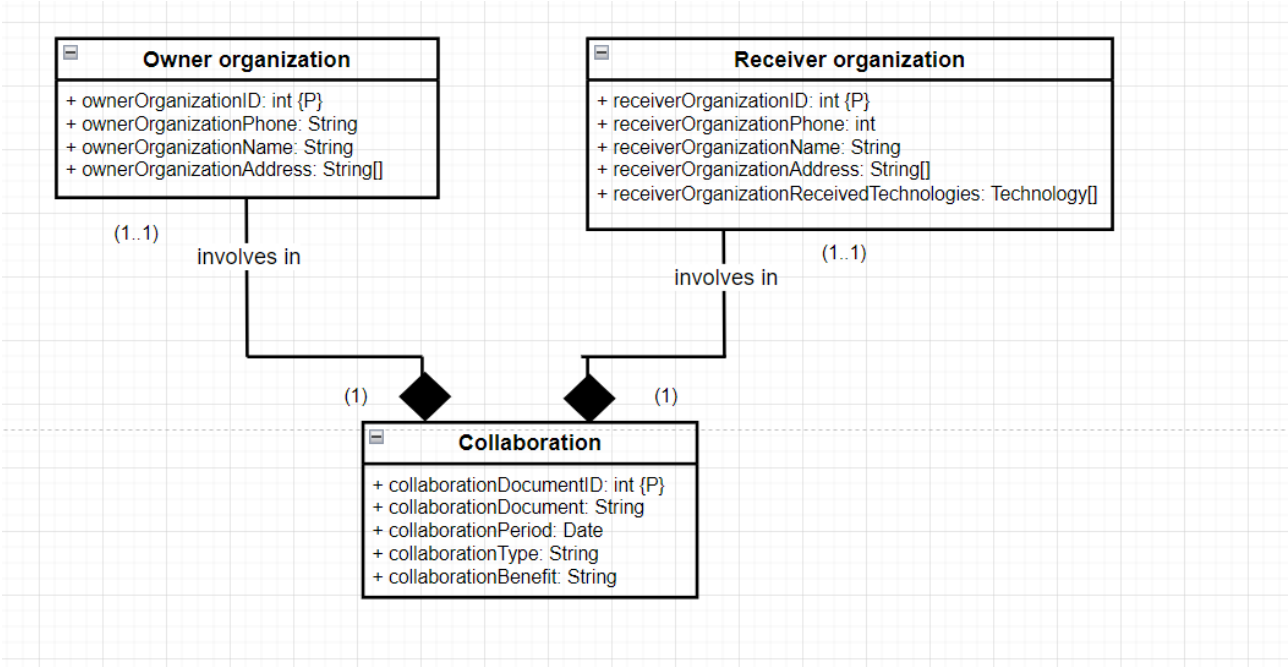
ER diagram



Composition in UML:

If we remove one of organizations makes collaboration we will make collaboration not possible

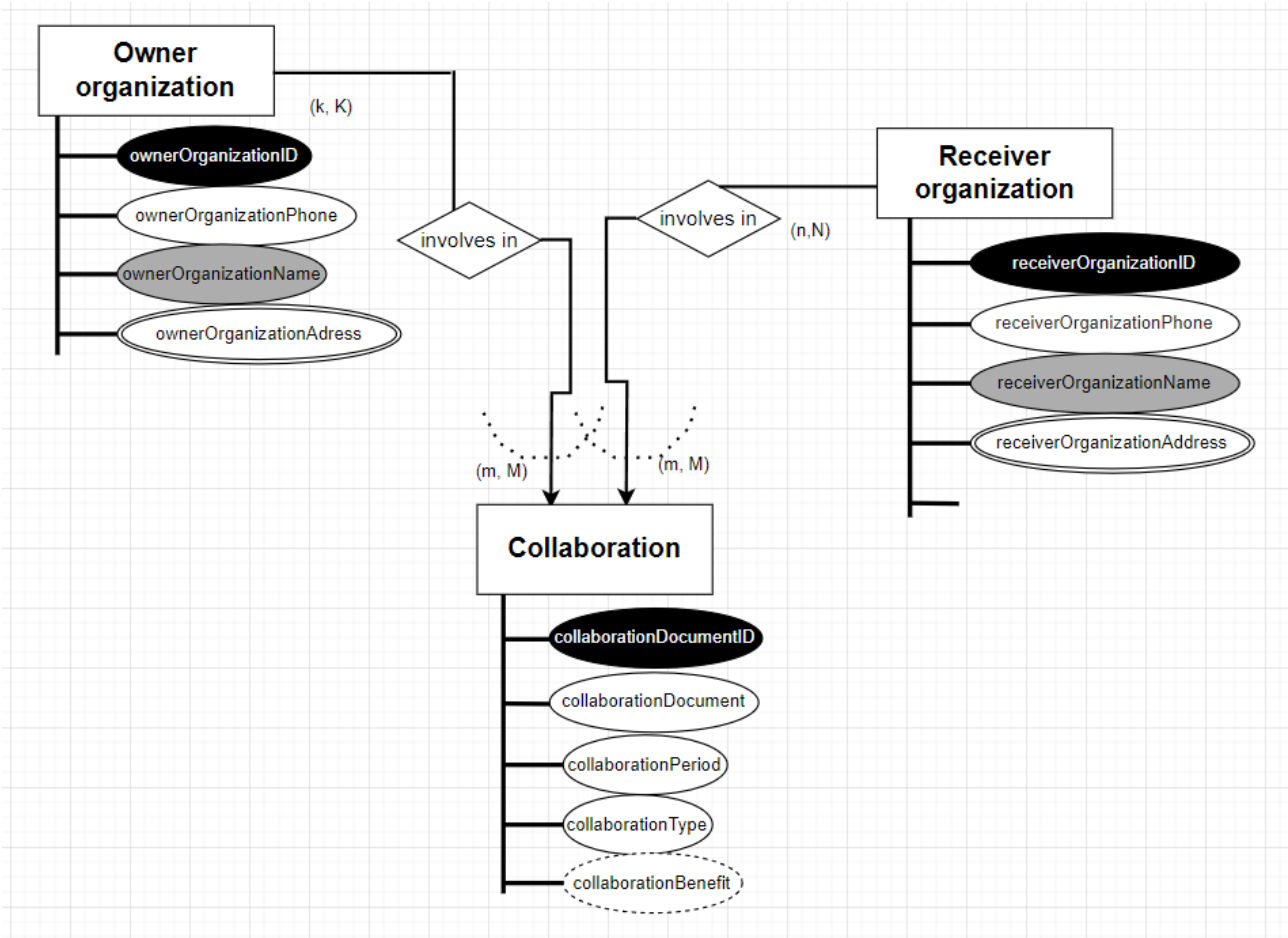
UML diagram



Aggregation in ER:

Same as in UML composition

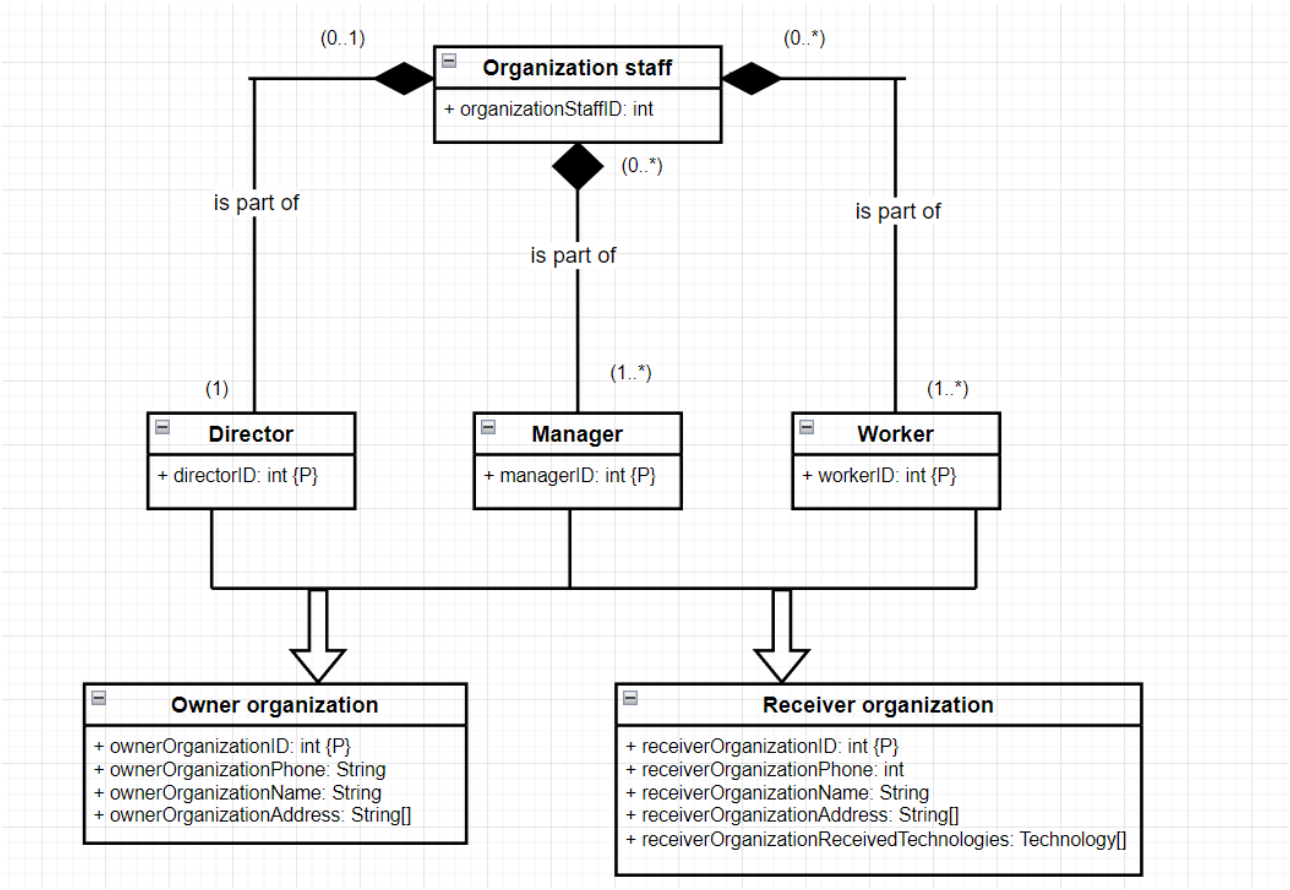
ER diagram



Aggregation in UML:

Same as composition in ER

UML diagram

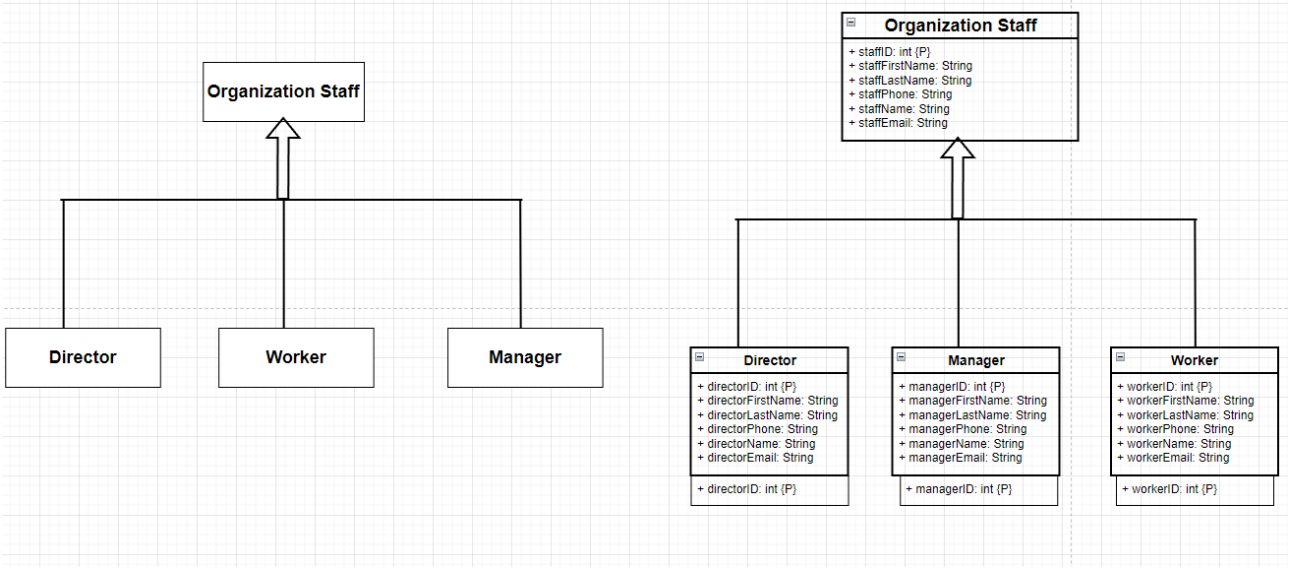


Output: we specified composition and aggregations and made corresponding diagrams

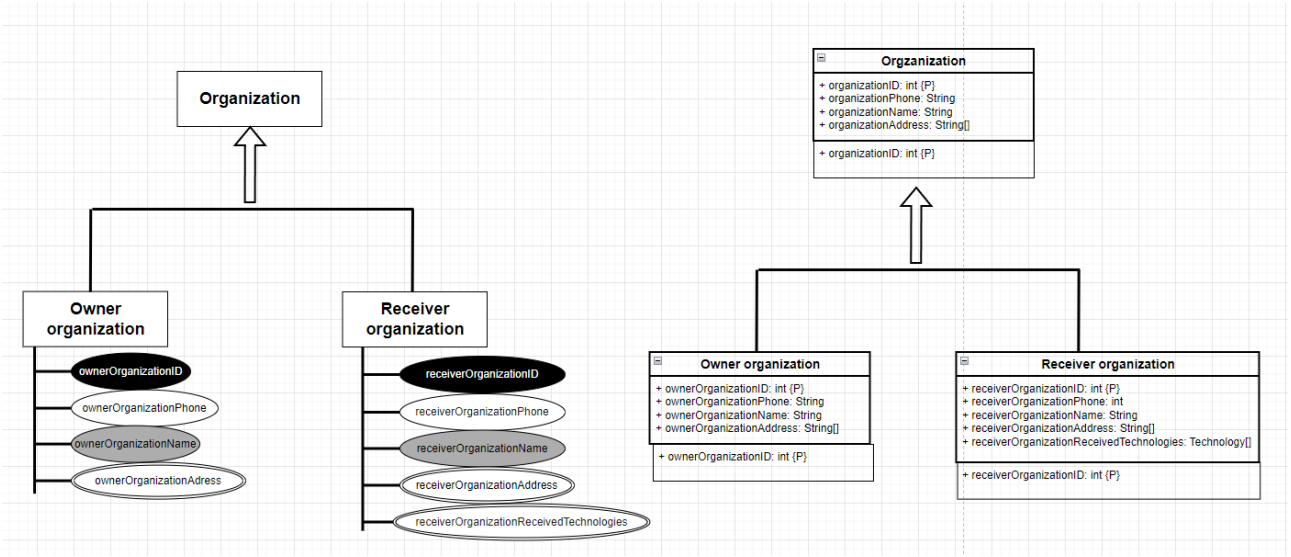
Step 8: Defining generalizations

Input: results from previous steps

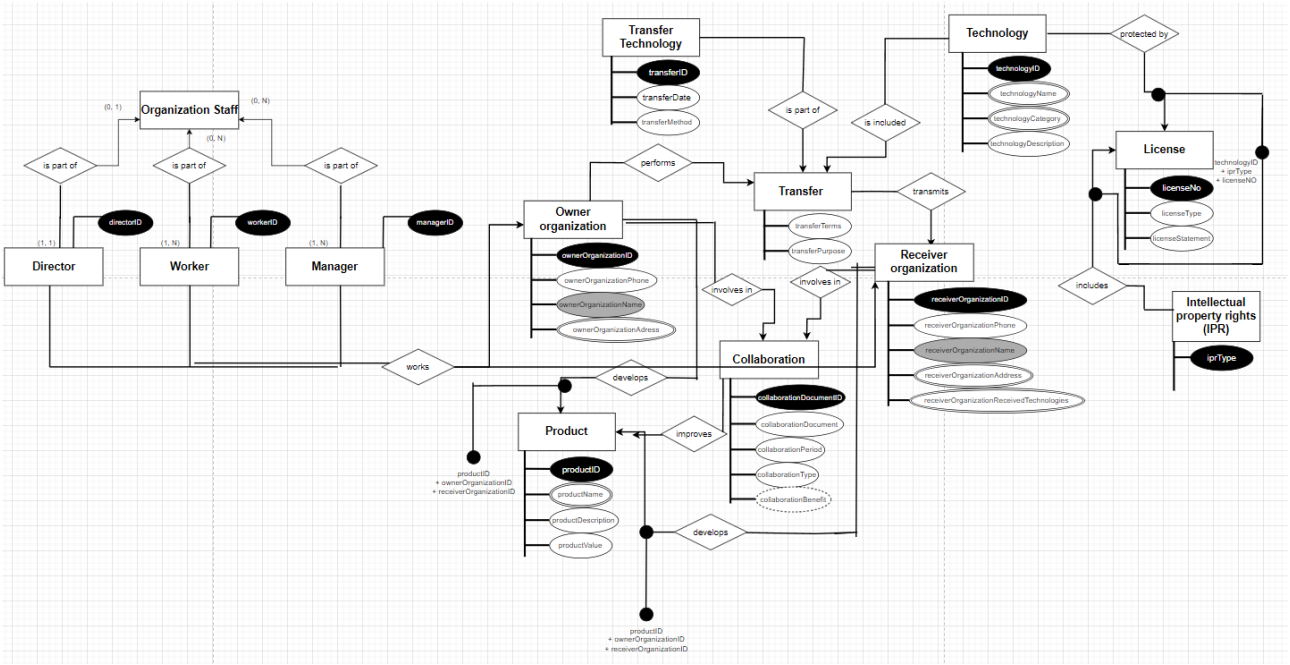
We can generalize our employees because they belong to super entity organization staff



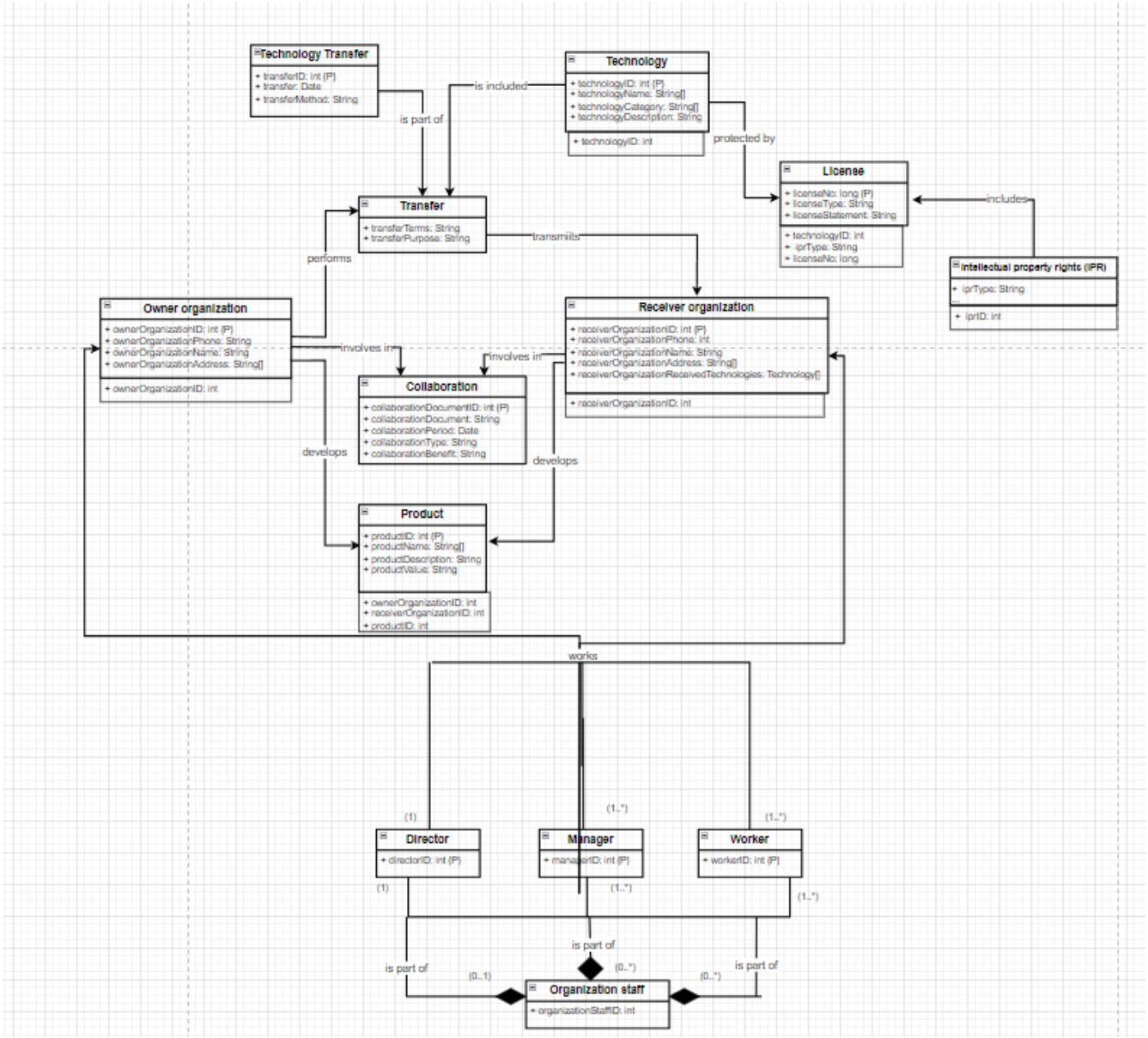
And we can specify our organization to more detailed 2 kinds of organizations that have some unique attributes



Final ER diagram



Final UML diagram



Sorry sometimes for bad quality, you can zoom in and in addition to the report I will sent file with all works and diagrams from draw.io.

Final results: I was trying to follow all the steps for my domain transfer technology.

I've made conceptual model with ER and UML diagrams and proper primary keys, candidate keys, weak and strong entity types, aggregations, compositions, generalizations and specializations. I think the result pretty well matches my requirements and I think it is complete enough for this case of conceptual model.