Министерство науки и высшего образования Российской Федерации   
Федеральное государственное бюджетное образовательное   
учреждение высшего образования   
«Алтайский государственный технический   
университет им. И.И. Ползунова»

Факультет информационных технологий

Кафедра прикладной математики

Отчёт защищён с оценкой\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Преподаватель Ананьев П.И.

«\_\_\_\_\_»\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_2022 г.

Отчёт

по лабораторной работе № 2

«Построение реляционной модели с использованием CASE-средств»

по дисциплине «Курсовая работа по базам данных»

Студенты группы ПИ-91 Гулин А.Н., Шинтяпин И.И., Шульпов В.М.

Преподаватель доцент Ананьев П.И.

Барнаул 2022

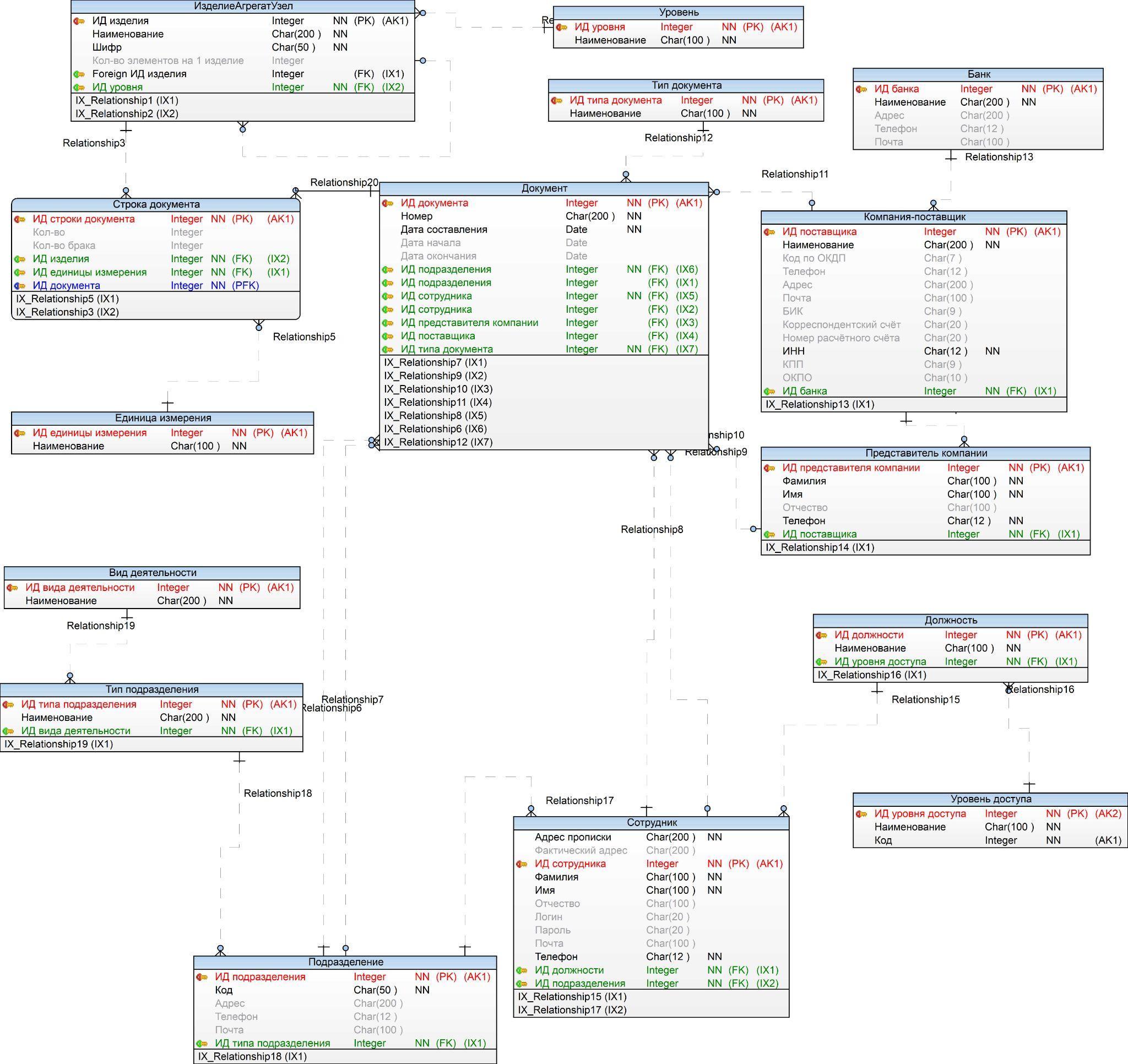
**Задание**

Используя концептуальную модель, построить логическую модель в технологии IDEF1X. Предусмотреть поддержание ссылочной целостности. На основании логической модели разработать физическую модель для выбранной СУБД.

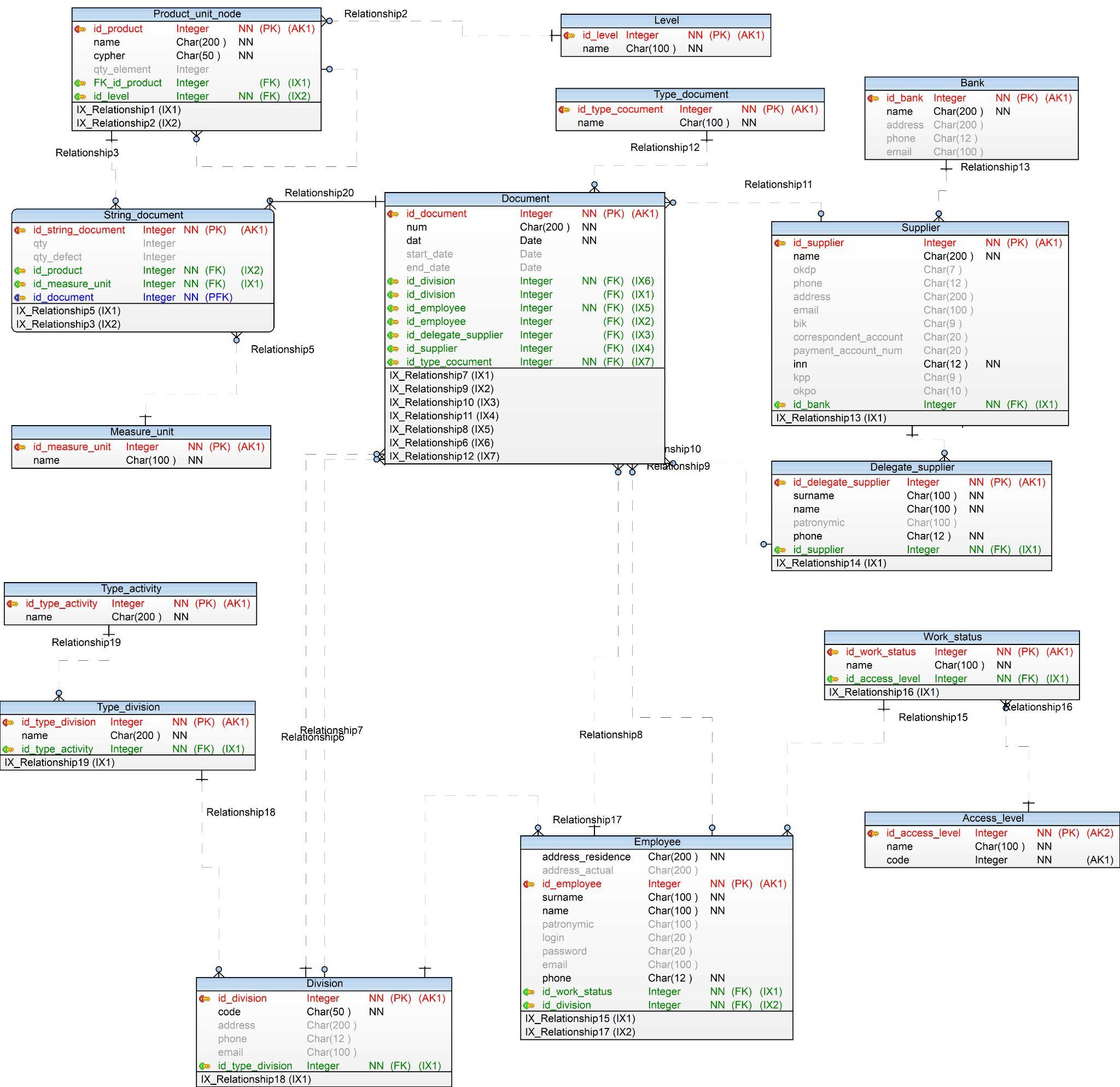
**Вариант 2.** Система управления поточно-массовым производством (на примере производства автомобилей).

**Выполнение работы**

**Логическая модель**

****

**Физическая модель**

****

**Скрипт для генерации БД**

/\*

Created: 11.10.2022

Modified: 14.10.2022

Model: Car\_manufacturing

Database: Oracle 19c

\*/

-- Create tables section -------------------------------------------------

-- Table Product\_unit\_node

**CREATE** **TABLE** "Product\_unit\_node"**(**

"id\_product" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"name" Char**(**200 **)** **NOT** **NULL,**

"cypher" Char**(**50 **)** **NOT** **NULL,**

"qty\_element" Integer**,**

"FK\_id\_product" Integer**,**

"id\_level" Integer

**)**

**/**

-- Create indexes for table Product\_unit\_node

**CREATE** **INDEX** "IX\_Relationship1" **ON** "Product\_unit\_node" **(**"FK\_id\_product"**)**

**/**

**CREATE** **INDEX** "IX\_Relationship21" **ON** "Product\_unit\_node" **(**"id\_level"**)**

**/**

-- Add keys for table Product\_unit\_node

**ALTER** **TABLE** "Product\_unit\_node" **ADD** **CONSTRAINT** "PK\_Product\_unit\_node" **PRIMARY** **KEY** **(**"id\_product"**)**

**/**

**ALTER** **TABLE** "Product\_unit\_node" **ADD** **CONSTRAINT** "ИД изделия" **UNIQUE** **(**"id\_product"**)**

**/**

-- Table String\_document

**CREATE** **TABLE** "String\_document"**(**

"id\_string\_document" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"qty" Integer**,**

"qty\_defect" Integer**,**

"id\_product" Integer **NOT** **NULL,**

"id\_measure\_unit" Integer **NOT** **NULL,**

"id\_document" Integer **NOT** **NULL**

**)**

**/**

-- Create indexes for table String\_document

**CREATE** **INDEX** "IX\_Relationship5" **ON** "String\_document" **(**"id\_measure\_unit"**)**

**/**

**CREATE** **INDEX** "IX\_Relationship3" **ON** "String\_document" **(**"id\_product"**)**

**/**

-- Add keys for table String\_document

**ALTER** **TABLE** "String\_document" **ADD** **CONSTRAINT** "PK\_String\_document" **PRIMARY** **KEY** **(**"id\_string\_document"**,**"id\_document"**)**

**/**

**ALTER** **TABLE** "String\_document" **ADD** **CONSTRAINT** "ИД строки документа" **UNIQUE** **(**"id\_string\_document"**)**

**/**

-- Table Measure\_unit

**CREATE** **TABLE** "Measure\_unit"**(**

"id\_measure\_unit" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"name" Char**(**100 **)** **NOT** **NULL**

**)**

**/**

-- Add keys for table Measure\_unit

**ALTER** **TABLE** "Measure\_unit" **ADD** **CONSTRAINT** "PK\_Measure\_unit" **PRIMARY** **KEY** **(**"id\_measure\_unit"**)**

**/**

**ALTER** **TABLE** "Measure\_unit" **ADD** **CONSTRAINT** "ИД единицы измерения" **UNIQUE** **(**"id\_measure\_unit"**)**

**/**

-- Table Document

**CREATE** **TABLE** "Document"**(**

"id\_document" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"num" Char**(**200 **)** **NOT** **NULL,**

"dat" Date **NOT** **NULL,**

"start\_date" Date**,**

"end\_date" Date**,**

"id\_division\_sender" Integer **NOT** **NULL,**

"id\_division\_reciever" Integer**,**

"id\_employee\_sender" Integer **NOT** **NULL,**

"id\_employee\_reciever" Integer**,**

"id\_delegate\_supplier" Integer**,**

"id\_supplier" Integer**,**

"id\_type\_cocument" Integer **NOT** **NULL**

**)**

**/**

-- Create indexes for table Document

**CREATE** **INDEX** "IX\_Relationship7" **ON** "Document" **(**"id\_division\_reciever"**)**

**/**

**CREATE** **INDEX** "IX\_Relationship9" **ON** "Document" **(**"id\_employee\_reciever"**)**

**/**

**CREATE** **INDEX** "IX\_Relationship10" **ON** "Document" **(**"id\_delegate\_supplier"**)**

**/**

**CREATE** **INDEX** "IX\_Relationship11" **ON** "Document" **(**"id\_supplier"**)**

**/**

**CREATE** **INDEX** "IX\_Relationship8" **ON** "Document" **(**"id\_employee\_sender"**)**

**/**

**CREATE** **INDEX** "IX\_Relationship6" **ON** "Document" **(**"id\_division\_sender"**)**

**/**

**CREATE** **INDEX** "IX\_Relationship12" **ON** "Document" **(**"id\_type\_cocument"**)**

**/**

-- Add keys for table Document

**ALTER** **TABLE** "Document" **ADD** **CONSTRAINT** "PK\_Document" **PRIMARY** **KEY** **(**"id\_document"**)**

**/**

**ALTER** **TABLE** "Document" **ADD** **CONSTRAINT** "ИД документа" **UNIQUE** **(**"id\_document"**)**

**/**

-- Table Type\_document

**CREATE** **TABLE** "Type\_document"**(**

"id\_type\_cocument" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"name" Char**(**100 **)** **NOT** **NULL**

**)**

**/**

-- Add keys for table Type\_document

**ALTER** **TABLE** "Type\_document" **ADD** **CONSTRAINT** "PK\_Type\_document" **PRIMARY** **KEY** **(**"id\_type\_cocument"**)**

**/**

**ALTER** **TABLE** "Type\_document" **ADD** **CONSTRAINT** "ИД типа документа" **UNIQUE** **(**"id\_type\_cocument"**)**

**/**

-- Table Employee

**CREATE** **TABLE** "Employee"**(**

"address\_residence" Char**(**200 **)** **NOT** **NULL,**

"address\_actual" Char**(**200 **),**

"id\_employee" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"surname" Char**(**100 **)** **NOT** **NULL,**

"name" Char**(**100 **)** **NOT** **NULL,**

"patronymic" Char**(**100 **),**

"login" Char**(**20 **),**

"password" Char**(**20 **),**

"email" Char**(**100 **),**

"phone" Char**(**12 **)** **NOT** **NULL,**

"id\_work\_status" Integer **NOT** **NULL,**

"id\_division" Integer **NOT** **NULL**

**)**

**/**

-- Create indexes for table Employee

**CREATE** **INDEX** "IX\_Relationship15" **ON** "Employee" **(**"id\_work\_status"**)**

**/**

**CREATE** **INDEX** "IX\_Relationship17" **ON** "Employee" **(**"id\_division"**)**

**/**

-- Add keys for table Employee

**ALTER** **TABLE** "Employee" **ADD** **CONSTRAINT** "PK\_Employee" **PRIMARY** **KEY** **(**"id\_employee"**)**

**/**

**ALTER** **TABLE** "Employee" **ADD** **CONSTRAINT** "ИД сотрудника" **UNIQUE** **(**"id\_employee"**)**

**/**

-- Table Work\_status

**CREATE** **TABLE** "Work\_status"**(**

"id\_work\_status" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"name" Char**(**100 **)** **NOT** **NULL,**

"id\_access\_level" Integer **NOT** **NULL**

**)**

**/**

-- Create indexes for table Work\_status

**CREATE** **INDEX** "IX\_Relationship16" **ON** "Work\_status" **(**"id\_access\_level"**)**

**/**

-- Add keys for table Work\_status

**ALTER** **TABLE** "Work\_status" **ADD** **CONSTRAINT** "PK\_Work\_status" **PRIMARY** **KEY** **(**"id\_work\_status"**)**

**/**

**ALTER** **TABLE** "Work\_status" **ADD** **CONSTRAINT** "ИД должности" **UNIQUE** **(**"id\_work\_status"**)**

**/**

-- Table Access\_level

**CREATE** **TABLE** "Access\_level"**(**

"id\_access\_level" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"name" Char**(**100 **)** **NOT** **NULL,**

"code" Integer **NOT** **NULL**

**)**

**/**

-- Add keys for table Access\_level

**ALTER** **TABLE** "Access\_level" **ADD** **CONSTRAINT** "PK\_Access\_level" **PRIMARY** **KEY** **(**"id\_access\_level"**)**

**/**

**ALTER** **TABLE** "Access\_level" **ADD** **CONSTRAINT** "Код" **UNIQUE** **(**"code"**)**

**/**

**ALTER** **TABLE** "Access\_level" **ADD** **CONSTRAINT** "ИД уровня доступа" **UNIQUE** **(**"id\_access\_level"**)**

**/**

-- Table Division

**CREATE** **TABLE** "Division"**(**

"id\_division" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"code" Char**(**50 **)** **NOT** **NULL,**

"address" Char**(**200 **),**

"phone" Char**(**12 **),**

"email" Char**(**100 **),**

"id\_type\_division" Integer **NOT** **NULL**

**)**

**/**

-- Create indexes for table Division

**CREATE** **INDEX** "IX\_Relationship18" **ON** "Division" **(**"id\_type\_division"**)**

**/**

-- Add keys for table Division

**ALTER** **TABLE** "Division" **ADD** **CONSTRAINT** "PK\_Division" **PRIMARY** **KEY** **(**"id\_division"**)**

**/**

**ALTER** **TABLE** "Division" **ADD** **CONSTRAINT** "ИД подразделения" **UNIQUE** **(**"id\_division"**)**

**/**

-- Table Type\_division

**CREATE** **TABLE** "Type\_division"**(**

"id\_type\_division" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"name" Char**(**200 **)** **NOT** **NULL,**

"id\_type\_activity" Integer **NOT** **NULL**

**)**

**/**

-- Create indexes for table Type\_division

**CREATE** **INDEX** "IX\_Relationship19" **ON** "Type\_division" **(**"id\_type\_activity"**)**

**/**

-- Add keys for table Type\_division

**ALTER** **TABLE** "Type\_division" **ADD** **CONSTRAINT** "PK\_Type\_division" **PRIMARY** **KEY** **(**"id\_type\_division"**)**

**/**

**ALTER** **TABLE** "Type\_division" **ADD** **CONSTRAINT** "ИД типа подразделения" **UNIQUE** **(**"id\_type\_division"**)**

**/**

-- Table Type\_activity

**CREATE** **TABLE** "Type\_activity"**(**

"id\_type\_activity" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"name" Char**(**200 **)** **NOT** **NULL**

**)**

**/**

-- Add keys for table Type\_activity

**ALTER** **TABLE** "Type\_activity" **ADD** **CONSTRAINT** "PK\_Type\_activity" **PRIMARY** **KEY** **(**"id\_type\_activity"**)**

**/**

**ALTER** **TABLE** "Type\_activity" **ADD** **CONSTRAINT** "ИД вида деятельности" **UNIQUE** **(**"id\_type\_activity"**)**

**/**

-- Table Supplier

**CREATE** **TABLE** "Supplier"**(**

"id\_supplier" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"name" Char**(**200 **)** **NOT** **NULL,**

"okdp" Char**(**7 **),**

"phone" Char**(**12 **),**

"address" Char**(**200 **),**

"email" Char**(**100 **),**

"bik" Char**(**9 **),**

"correspondent\_account" Char**(**20 **),**

"payment\_account\_num" Char**(**20 **),**

"inn" Char**(**12 **)** **NOT** **NULL,**

"kpp" Char**(**9 **),**

"okpo" Char**(**10 **),**

"id\_bank" Integer **NOT** **NULL**

**)**

**/**

-- Create indexes for table Supplier

**CREATE** **INDEX** "IX\_Relationship13" **ON** "Supplier" **(**"id\_bank"**)**

**/**

-- Add keys for table Supplier

**ALTER** **TABLE** "Supplier" **ADD** **CONSTRAINT** "PK\_Supplier" **PRIMARY** **KEY** **(**"id\_supplier"**)**

**/**

**ALTER** **TABLE** "Supplier" **ADD** **CONSTRAINT** "ИД поставщика" **UNIQUE** **(**"id\_supplier"**)**

**/**

-- Table Bank

**CREATE** **TABLE** "Bank"**(**

"id\_bank" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"name" Char**(**200 **)** **NOT** **NULL,**

"address" Char**(**200 **),**

"phone" Char**(**12 **),**

"email" Char**(**100 **)**

**)**

**/**

-- Add keys for table Bank

**ALTER** **TABLE** "Bank" **ADD** **CONSTRAINT** "PK\_Bank" **PRIMARY** **KEY** **(**"id\_bank"**)**

**/**

**ALTER** **TABLE** "Bank" **ADD** **CONSTRAINT** "ИД банка" **UNIQUE** **(**"id\_bank"**)**

**/**

-- Table Delegate\_supplier

**CREATE** **TABLE** "Delegate\_supplier"**(**

"id\_delegate\_supplier" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"surname" Char**(**100 **)** **NOT** **NULL,**

"name" Char**(**100 **)** **NOT** **NULL,**

"patronymic" Char**(**100 **),**

"phone" Char**(**12 **)** **NOT** **NULL,**

"id\_supplier" Integer **NOT** **NULL**

**)**

**/**

-- Create indexes for table Delegate\_supplier

**CREATE** **INDEX** "IX\_Relationship14" **ON** "Delegate\_supplier" **(**"id\_supplier"**)**

**/**

-- Add keys for table Delegate\_supplier

**ALTER** **TABLE** "Delegate\_supplier" **ADD** **CONSTRAINT** "PK\_Delegate\_supplier" **PRIMARY** **KEY** **(**"id\_delegate\_supplier"**)**

**/**

**ALTER** **TABLE** "Delegate\_supplier" **ADD** **CONSTRAINT** "ИД представителя компании" **UNIQUE** **(**"id\_delegate\_supplier"**)**

**/**

-- Table Level

**CREATE** **TABLE** "Level"**(**

"id\_level" Integer GENERATED ALWAYS **AS** **IDENTITY(**

**START** **WITH** 1

**INCREMENT** **BY** 1

NOMAXVALUE

NOMINVALUE

NOCACHE**)** **NOT** **NULL,**

"name" Char**(**100 **)** **NOT** **NULL**

**)**

**/**

-- Add keys for table Level

**ALTER** **TABLE** "Level" **ADD** **CONSTRAINT** "PK\_Level" **PRIMARY** **KEY** **(**"id\_level"**)**

**/**

**ALTER** **TABLE** "Level" **ADD** **CONSTRAINT** "ИД уровня" **UNIQUE** **(**"id\_level"**)**

**/**

-- Create foreign keys (relationships) section -------------------------------------------------

**ALTER** **TABLE** "Product\_unit\_node" **ADD** **CONSTRAINT** "Relationship1" **FOREIGN** **KEY** **(**"FK\_id\_product"**)** **REFERENCES** "Product\_unit\_node" **(**"id\_product"**)**

**/**

**ALTER** **TABLE** "String\_document" **ADD** **CONSTRAINT** "Relationship3" **FOREIGN** **KEY** **(**"id\_product"**)** **REFERENCES** "Product\_unit\_node" **(**"id\_product"**)**

**/**

**ALTER** **TABLE** "String\_document" **ADD** **CONSTRAINT** "Relationship5" **FOREIGN** **KEY** **(**"id\_measure\_unit"**)** **REFERENCES** "Measure\_unit" **(**"id\_measure\_unit"**)**

**/**

**ALTER** **TABLE** "Document" **ADD** **CONSTRAINT** "Relationship6" **FOREIGN** **KEY** **(**"id\_division\_sender"**)** **REFERENCES** "Division" **(**"id\_division"**)**

**/**

**ALTER** **TABLE** "Document" **ADD** **CONSTRAINT** "Relationship7" **FOREIGN** **KEY** **(**"id\_division\_reciever"**)** **REFERENCES** "Division" **(**"id\_division"**)**

**/**

**ALTER** **TABLE** "Document" **ADD** **CONSTRAINT** "Relationship8" **FOREIGN** **KEY** **(**"id\_employee\_sender"**)** **REFERENCES** "Employee" **(**"id\_employee"**)**

**/**

**ALTER** **TABLE** "Document" **ADD** **CONSTRAINT** "Relationship9" **FOREIGN** **KEY** **(**"id\_employee\_reciever"**)** **REFERENCES** "Employee" **(**"id\_employee"**)**

**/**

**ALTER** **TABLE** "Document" **ADD** **CONSTRAINT** "Relationship10" **FOREIGN** **KEY** **(**"id\_delegate\_supplier"**)** **REFERENCES** "Delegate\_supplier" **(**"id\_delegate\_supplier"**)**

**/**

**ALTER** **TABLE** "Document" **ADD** **CONSTRAINT** "Relationship11" **FOREIGN** **KEY** **(**"id\_supplier"**)** **REFERENCES** "Supplier" **(**"id\_supplier"**)**

**/**

**ALTER** **TABLE** "Document" **ADD** **CONSTRAINT** "Relationship12" **FOREIGN** **KEY** **(**"id\_type\_cocument"**)** **REFERENCES** "Type\_document" **(**"id\_type\_cocument"**)**

**/**

**ALTER** **TABLE** "Supplier" **ADD** **CONSTRAINT** "Relationship13" **FOREIGN** **KEY** **(**"id\_bank"**)** **REFERENCES** "Bank" **(**"id\_bank"**)**

**/**

**ALTER** **TABLE** "Delegate\_supplier" **ADD** **CONSTRAINT** "Relationship14" **FOREIGN** **KEY** **(**"id\_supplier"**)** **REFERENCES** "Supplier" **(**"id\_supplier"**)**

**/**

**ALTER** **TABLE** "Employee" **ADD** **CONSTRAINT** "Relationship15" **FOREIGN** **KEY** **(**"id\_work\_status"**)** **REFERENCES** "Work\_status" **(**"id\_work\_status"**)**

**/**

**ALTER** **TABLE** "Work\_status" **ADD** **CONSTRAINT** "Relationship16" **FOREIGN** **KEY** **(**"id\_access\_level"**)** **REFERENCES** "Access\_level" **(**"id\_access\_level"**)**

**/**

**ALTER** **TABLE** "Employee" **ADD** **CONSTRAINT** "Relationship17" **FOREIGN** **KEY** **(**"id\_division"**)** **REFERENCES** "Division" **(**"id\_division"**)**

**/**

**ALTER** **TABLE** "Division" **ADD** **CONSTRAINT** "Relationship18" **FOREIGN** **KEY** **(**"id\_type\_division"**)** **REFERENCES** "Type\_division" **(**"id\_type\_division"**)**

**/**

**ALTER** **TABLE** "Type\_division" **ADD** **CONSTRAINT** "Relationship19" **FOREIGN** **KEY** **(**"id\_type\_activity"**)** **REFERENCES** "Type\_activity" **(**"id\_type\_activity"**)**

**/**

**ALTER** **TABLE** "String\_document" **ADD** **CONSTRAINT** "Relationship20" **FOREIGN** **KEY** **(**"id\_document"**)** **REFERENCES** "Document" **(**"id\_document"**)** **ON** **DELETE** **CASCADE**

**/**

**ALTER** **TABLE** "Product\_unit\_node" **ADD** **CONSTRAINT** "Relationship21" **FOREIGN** **KEY** **(**"id\_level"**)** **REFERENCES** "Level" **(**"id\_level"**)**

**/**