Министерство образования Республики Беларусь

Учреждение образования  
 БЕЛОРУССКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ  
 ИНФОРМАТИКИ И РАДИОЭЛЕКТРОНИКИ

Факультет компьютерного проектирования

Кафедра проектирования информационно-компьютерных систем

Анализ и оптимизация бизнес-процессов

Отчет

по результатам выполнения задания к практическому занятию №5

на тему:

## 

**МЕТОДЫ ОПТИМИЗАЦИИ ПРОГРАММНОГО КОДА**

|  |  |  |
| --- | --- | --- |
| Проверил |  | А.В. Шелест |
|  | (подпись) |  |
| зачтено |  |  |
|  | (дата защиты) |  |
|  |  |  |
| Выполнил |  | Е.А. Корсаков  гр. 114301 |
|  | (подпись) |  |

Минск, 2024

**Цель:** *Описание процесса развертывания ПС*

Ссылка на репозиторий *GitHub*: [BUSIK](https://github.com/D1le1/BUSIK)

Действия для установки (развёртыванию) программного средства на операционной системе *Android*. Программное средство работает на платформе *Android Studio*, СУБД – *SQLite*.

Шаги для установки программного средства:

1. Установка окружения:
   1. Скачайте с официального сайта последнюю версию установщика *Intelij IDEA*;
   2. Запустите установщик и выберите установку *Intelij IDEA Community*;
   3. Скачайте с официального сайта установщик для *Db Browser* и установите *Db Browser SQLite*.
2. Настройка проекта:
   1. Установите необходимый вам порт;
   2. Запустите переданный вам проект *Server*;
   3. Скачайте и установите переданный вам *.apk* файл с установочником мобильного приложения.
3. Дополнительно:
   1. Посмотрите *ip* адрес в локальной сети для устройства, на котором запускается сервер и установите его в настройках приложения.
4. Запуск проекта:
   1. Запустите мобильное приложение *BUSIK*.

Скрипт для создания базы данных в *SQLite*:

USE [TradingDB]

GO

SET ANSI\_NULLS ON

GO

SET QUOTED\_IDENTIFIER ON

GO

CREATE TABLE [dbo].[AspNetRoles](

[Id] [nvarchar](450) NOT NULL,

[Name] [nvarchar](256) NULL,

[NormalizedName] [nvarchar](256) NULL,

[ConcurrencyStamp] [nvarchar](max) NULL,

CONSTRAINT [PK\_AspNetRoles] PRIMARY KEY CLUSTERED

(

[Id] ASC

)WITH (PAD\_INDEX = OFF, STATISTICS\_NORECOMPUTE = OFF, IGNORE\_DUP\_KEY = OFF, ALLOW\_ROW\_LOCKS = ON, ALLOW\_PAGE\_LOCKS = ON, OPTIMIZE\_FOR\_SEQUENTIAL\_KEY = OFF) ON [PRIMARY]

) ON [PRIMARY] TEXTIMAGE\_ON [PRIMARY]

GO

SET ANSI\_NULLS ON

GO

SET QUOTED\_IDENTIFIER ON

GO

CREATE TABLE [dbo].[AspNetUserRoles](

[UserId] [nvarchar](450) NOT NULL,

[RoleId] [nvarchar](450) NOT NULL,

CONSTRAINT [PK\_AspNetUserRoles] PRIMARY KEY CLUSTERED,

[UserId] ASC,

[RoleId] ASC

)WITH (PAD\_INDEX = OFF, STATISTICS\_NORECOMPUTE = OFF, IGNORE\_DUP\_KEY = OFF, ALLOW\_ROW\_LOCKS = ON, ALLOW\_PAGE\_LOCKS = ON, OPTIMIZE\_FOR\_SEQUENTIAL\_KEY = OFF) ON [PRIMARY]

) ON [PRIMARY]

GO

SET ANSI\_NULLS ON

GO

SET QUOTED\_IDENTIFIER ON

GO

CREATE TABLE [dbo].[AspNetUsers](

[Id] [nvarchar](450) NOT NULL,

[UserName] [nvarchar](256) NULL,

[NormalizedUserName] [nvarchar](256) NULL,

[Email] [nvarchar](256) NULL,

[NormalizedEmail] [nvarchar](256) NULL,

[EmailConfirmed] [bit] NOT NULL,

[PasswordHash] [nvarchar](max) NULL,

[SecurityStamp] [nvarchar](max) NULL,

[ConcurrencyStamp] [nvarchar](max) NULL,

[PhoneNumber] [nvarchar](max) NULL,

[PhoneNumberConfirmed] [bit] NOT NULL,

[TwoFactorEnabled] [bit] NOT NULL,

[LockoutEnd] [datetimeoffset](7) NULL,

[LockoutEnabled] [bit] NOT NULL,

[AccessFailedCount] [int] NOT NULL,

CONSTRAINT [PK\_AspNetUsers] PRIMARY KEY CLUSTERED

(

[Id] ASC

)WITH (PAD\_INDEX = OFF, STATISTICS\_NORECOMPUTE = OFF, IGNORE\_DUP\_KEY = OFF, ALLOW\_ROW\_LOCKS = ON, ALLOW\_PAGE\_LOCKS = ON, OPTIMIZE\_FOR\_SEQUENTIAL\_KEY = OFF) ON [PRIMARY]

) ON [PRIMARY] TEXTIMAGE\_ON [PRIMARY]

GO

SET ANSI\_NULLS ON

GO

SET QUOTED\_IDENTIFIER ON

GO

CREATE TABLE [dbo].[Clients](

[FirstName] [nvarchar](max) NOT NULL,

[LastName] [nvarchar](max) NOT NULL,

[UserId] [nvarchar](450) NOT NULL,

[Phone] [nvarchar](max) NOT NULL,

CONSTRAINT [PK\_Clients] PRIMARY KEY CLUSTERED

(

[UserId] ASC

)WITH (PAD\_INDEX = OFF, STATISTICS\_NORECOMPUTE = OFF, IGNORE\_DUP\_KEY = OFF, ALLOW\_ROW\_LOCKS = ON, ALLOW\_PAGE\_LOCKS = ON, OPTIMIZE\_FOR\_SEQUENTIAL\_KEY = OFF) ON [PRIMARY]

) ON [PRIMARY] TEXTIMAGE\_ON [PRIMARY]

GO

SET ANSI\_NULLS ON

GO

SET QUOTED\_IDENTIFIER ON

GO

CREATE TABLE [dbo].[Companies](

[Name] [nvarchar](max) NOT NULL,

[Kpp] [nvarchar](max) NOT NULL,

[Inn] [nvarchar](max) NOT NULL,

[UserId] [nvarchar](450) NOT NULL,

[Phone] [nvarchar](max) NOT NULL,

[BankAccount] [nvarchar](max) NOT NULL,

[BankBic] [nvarchar](max) NOT NULL,

[BankName] [nvarchar](max) NOT NULL,

[Email] [nvarchar](max) NOT NULL,

CONSTRAINT [PK\_Companies] PRIMARY KEY CLUSTERED

(

[UserId] ASC

)WITH (PAD\_INDEX = OFF, STATISTICS\_NORECOMPUTE = OFF, IGNORE\_DUP\_KEY = OFF, ALLOW\_ROW\_LOCKS = ON, ALLOW\_PAGE\_LOCKS = ON, OPTIMIZE\_FOR\_SEQUENTIAL\_KEY = OFF) ON [PRIMARY]

) ON [PRIMARY] TEXTIMAGE\_ON [PRIMARY]

GO

SET ANSI\_NULLS ON

GO

SET QUOTED\_IDENTIFIER ON

GO

CREATE TABLE [dbo].[Employees](

[UserId] [nvarchar](450) NOT NULL,

[FirstName] [nvarchar](max) NOT NULL,

[LastName] [nvarchar](max) NOT NULL,

[Phone] [nvarchar](max) NOT NULL,

[Role] [nvarchar](max) NOT NULL,

CONSTRAINT [PK\_Employees] PRIMARY KEY CLUSTERED

(

[UserId] ASC

)WITH (PAD\_INDEX = OFF, STATISTICS\_NORECOMPUTE = OFF, IGNORE\_DUP\_KEY = OFF, ALLOW\_ROW\_LOCKS = ON, ALLOW\_PAGE\_LOCKS = ON, OPTIMIZE\_FOR\_SEQUENTIAL\_KEY = OFF) ON [PRIMARY]

) ON [PRIMARY] TEXTIMAGE\_ON [PRIMARY]

GO

SET ANSI\_NULLS ON

GO

SET QUOTED\_IDENTIFIER ON

GO

CREATE TABLE [dbo].[OrderProducts](

[OrderId] [int] NOT NULL,

[ProductId] [int] NOT NULL,

[Quantity] [int] NOT NULL,

[ProductPrice] [decimal](18, 2) NOT NULL,

[ProductDescription] [nvarchar](max) NOT NULL,

[ProductName] [nvarchar](max) NOT NULL,

CONSTRAINT [PK\_OrderProducts] PRIMARY KEY CLUSTERED

(

[OrderId] ASC,

[ProductId] ASC

)WITH (PAD\_INDEX = OFF, STATISTICS\_NORECOMPUTE = OFF, IGNORE\_DUP\_KEY = OFF, ALLOW\_ROW\_LOCKS = ON, ALLOW\_PAGE\_LOCKS = ON, OPTIMIZE\_FOR\_SEQUENTIAL\_KEY = OFF) ON [PRIMARY]

) ON [PRIMARY] TEXTIMAGE\_ON [PRIMARY]

GO

SET ANSI\_NULLS ON

GO

SET QUOTED\_IDENTIFIER ON

GO

CREATE TABLE [dbo].[Orders](

[Id] [int] IDENTITY(1,1) NOT NULL,

[UserId] [nvarchar](450) NOT NULL,

[State] [int] NOT NULL,

[ChangeDate] [datetime2](7) NOT NULL,

[ClientName] [nvarchar](max) NOT NULL,

[ContactPhone] [nvarchar](max) NOT NULL,

[OrderDate] [datetime2](7) NOT NULL,

[Type] [int] NOT NULL,

[PaymentType] [int] NOT NULL,

[StockId] [int] NULL,

CONSTRAINT [PK\_Orders] PRIMARY KEY CLUSTERED

(

[Id] ASC

)WITH (PAD\_INDEX = OFF, STATISTICS\_NORECOMPUTE = OFF, IGNORE\_DUP\_KEY = OFF, ALLOW\_ROW\_LOCKS = ON, ALLOW\_PAGE\_LOCKS = ON, OPTIMIZE\_FOR\_SEQUENTIAL\_KEY = OFF) ON [PRIMARY]

) ON [PRIMARY] TEXTIMAGE\_ON [PRIMARY]

GO

SET ANSI\_NULLS ON

GO

SET QUOTED\_IDENTIFIER ON

GO

CREATE TABLE [dbo].[OrdersDelivery](

[OrderId] [int] NOT NULL,

[DeliveryDate] [datetime2](7) NOT NULL,

[City] [nvarchar](max) NOT NULL,

[Street] [nvarchar](max) NOT NULL,

[House] [nvarchar](max) NOT NULL,

[Flat] [nvarchar](max) NOT NULL,

[PostalCode] [nvarchar](max) NOT NULL,

CONSTRAINT [PK\_OrdersDelivery] PRIMARY KEY CLUSTERED

(

[OrderId] ASC

)WITH (PAD\_INDEX = OFF, STATISTICS\_NORECOMPUTE = OFF, IGNORE\_DUP\_KEY = OFF, ALLOW\_ROW\_LOCKS = ON, ALLOW\_PAGE\_LOCKS = ON, OPTIMIZE\_FOR\_SEQUENTIAL\_KEY = OFF) ON [PRIMARY]

) ON [PRIMARY] TEXTIMAGE\_ON [PRIMARY]

GO

SET ANSI\_NULLS ON

GO

SET QUOTED\_IDENTIFIER ON

GO

CREATE TABLE [dbo].[Products](

[Id] [int] IDENTITY(1,1) NOT NULL,

[Name] [nvarchar](max) NOT NULL,

[WholesalePrice] [decimal](18, 2) NOT NULL,

[Description] [nvarchar](max) NOT NULL,

[RetailPrice] [decimal](18, 2) NOT NULL,

CONSTRAINT [PK\_Products] PRIMARY KEY CLUSTERED

(

[Id] ASC

)WITH (PAD\_INDEX = OFF, STATISTICS\_NORECOMPUTE = OFF, IGNORE\_DUP\_KEY = OFF, ALLOW\_ROW\_LOCKS = ON, ALLOW\_PAGE\_LOCKS = ON, OPTIMIZE\_FOR\_SEQUENTIAL\_KEY = OFF) ON [PRIMARY]

) ON [PRIMARY] TEXTIMAGE\_ON [PRIMARY]

GO

SET ANSI\_NULLS ON

GO

SET QUOTED\_IDENTIFIER ON

GO

CREATE TABLE [dbo].[Sales](

[Id] [int] IDENTITY(1,1) NOT NULL,

[SaleDate] [datetime2](7) NOT NULL,

[SaleType] [int] NOT NULL,

[OrderId] [int] NOT NULL,

[StockId] [int] NOT NULL,

CONSTRAINT [PK\_Sales] PRIMARY KEY CLUSTERED

(

[Id] ASC

)WITH (PAD\_INDEX = OFF, STATISTICS\_NORECOMPUTE = OFF, IGNORE\_DUP\_KEY = OFF, ALLOW\_ROW\_LOCKS = ON, ALLOW\_PAGE\_LOCKS = ON, OPTIMIZE\_FOR\_SEQUENTIAL\_KEY = OFF) ON [PRIMARY]

) ON [PRIMARY]

GO

SET ANSI\_NULLS ON

GO

SET QUOTED\_IDENTIFIER ON

GO

CREATE TABLE [dbo].[StockProducts](

[StockId] [int] NOT NULL,

[ProductId] [int] NOT NULL,

[Quantity] [int] NOT NULL,

[Discount] [decimal](18, 2) NOT NULL,

CONSTRAINT [PK\_StockProducts] PRIMARY KEY CLUSTERED

(

[StockId] ASC,

[ProductId] ASC

)WITH (PAD\_INDEX = OFF, STATISTICS\_NORECOMPUTE = OFF, IGNORE\_DUP\_KEY = OFF, ALLOW\_ROW\_LOCKS = ON, ALLOW\_PAGE\_LOCKS = ON, OPTIMIZE\_FOR\_SEQUENTIAL\_KEY = OFF) ON [PRIMARY]

) ON [PRIMARY]

GO

SET ANSI\_NULLS ON

GO

SET QUOTED\_IDENTIFIER ON

GO

CREATE TABLE [dbo].[Stocks](

[Id] [int] IDENTITY(1,1) NOT NULL,

[Name] [nvarchar](max) NOT NULL,

[Location] [nvarchar](max) NOT NULL,

[SaleType] [int] NOT NULL,

CONSTRAINT [PK\_Stocks] PRIMARY KEY CLUSTERED

(

[Id] ASC

)WITH (PAD\_INDEX = OFF, STATISTICS\_NORECOMPUTE = OFF, IGNORE\_DUP\_KEY = OFF, ALLOW\_ROW\_LOCKS = ON, ALLOW\_PAGE\_LOCKS = ON, OPTIMIZE\_FOR\_SEQUENTIAL\_KEY = OFF) ON [PRIMARY]

) ON [PRIMARY] TEXTIMAGE\_ON [PRIMARY]

GO

ALTER TABLE [dbo].[Clients] ADD DEFAULT (N'') FOR [Phone]

GO

ALTER TABLE [dbo].[Companies] ADD DEFAULT (N'') FOR [Phone]

GO

ALTER TABLE [dbo].[Companies] ADD DEFAULT (N'') FOR [BankAccount]

GO

ALTER TABLE [dbo].[Companies] ADD DEFAULT (N'') FOR [BankBic]

GO

ALTER TABLE [dbo].[Companies] ADD DEFAULT (N'') FOR [BankName]

GO

ALTER TABLE [dbo].[Companies] ADD DEFAULT (N'') FOR [Email]

GO

ALTER TABLE [dbo].[OrderProducts] ADD DEFAULT ((0.0)) FOR [ProductPrice]

GO

ALTER TABLE [dbo].[OrderProducts] ADD DEFAULT (N'') FOR [ProductDescription]

GO

ALTER TABLE [dbo].[OrderProducts] ADD DEFAULT (N'') FOR [ProductName]

GO

ALTER TABLE [dbo].[Orders] ADD DEFAULT ('0001-01-01T00:00:00.0000000') FOR [ChangeDate]

GO

ALTER TABLE [dbo].[Orders] ADD DEFAULT (N'') FOR [ClientName]

GO

ALTER TABLE [dbo].[Orders] ADD DEFAULT (N'') FOR [ContactPhone]

GO

ALTER TABLE [dbo].[Orders] ADD DEFAULT ('0001-01-01T00:00:00.0000000') FOR [OrderDate]

GO

ALTER TABLE [dbo].[Orders] ADD DEFAULT ((0)) FOR [Type]

GO

ALTER TABLE [dbo].[Products] ADD DEFAULT ((0.0)) FOR [RetailPrice]

GO

ALTER TABLE [dbo].[Sales] ADD DEFAULT ((0)) FOR [StockId]

GO

ALTER TABLE [dbo].[StockProducts] ADD DEFAULT ((0.0)) FOR [Discount]

GO

ALTER TABLE [dbo].[Stocks] ADD DEFAULT ((0)) FOR [SaleType]

GO

ALTER TABLE [dbo].[AspNetUserRoles] WITH CHECK ADD CONSTRAINT [FK\_AspNetUserRoles\_AspNetRoles\_RoleId] FOREIGN KEY([RoleId])

REFERENCES [dbo].[AspNetRoles] ([Id])

ON DELETE CASCADE

GO

ALTER TABLE [dbo].[AspNetUserRoles] CHECK CONSTRAINT [FK\_AspNetUserRoles\_AspNetRoles\_RoleId]

GO

ALTER TABLE [dbo].[AspNetUserRoles] WITH CHECK ADD CONSTRAINT [FK\_AspNetUserRoles\_AspNetUsers\_UserId] FOREIGN KEY([UserId])

REFERENCES [dbo].[AspNetUsers] ([Id])

ON DELETE CASCADE

GO

ALTER TABLE [dbo].[AspNetUserRoles] CHECK CONSTRAINT [FK\_AspNetUserRoles\_AspNetUsers\_UserId]

GO

ALTER TABLE [dbo].[Clients] WITH CHECK ADD CONSTRAINT [FK\_Clients\_AspNetUsers\_UserId] FOREIGN KEY([UserId])

REFERENCES [dbo].[AspNetUsers] ([Id])

ON DELETE CASCADE

GO

ALTER TABLE [dbo].[Clients] CHECK CONSTRAINT [FK\_Clients\_AspNetUsers\_UserId]

GO

ALTER TABLE [dbo].[Companies] WITH CHECK ADD CONSTRAINT [FK\_Companies\_AspNetUsers\_UserId] FOREIGN KEY([UserId])

REFERENCES [dbo].[AspNetUsers] ([Id])

ON DELETE CASCADE

GO

ALTER TABLE [dbo].[Companies] CHECK CONSTRAINT [FK\_Companies\_AspNetUsers\_UserId]

GO

ALTER TABLE [dbo].[Employees] WITH CHECK ADD CONSTRAINT [FK\_Employees\_AspNetUsers\_UserId] FOREIGN KEY([UserId])

REFERENCES [dbo].[AspNetUsers] ([Id])

ON DELETE CASCADE

GO

ALTER TABLE [dbo].[Employees] CHECK CONSTRAINT [FK\_Employees\_AspNetUsers\_UserId]

GO

ALTER TABLE [dbo].[OrderProducts] WITH CHECK ADD CONSTRAINT [FK\_OrderProducts\_Orders\_OrderId] FOREIGN KEY([OrderId])

REFERENCES [dbo].[Orders] ([Id])

ON DELETE CASCADE

GO

ALTER TABLE [dbo].[OrderProducts] CHECK CONSTRAINT [FK\_OrderProducts\_Orders\_OrderId]

GO

ALTER TABLE [dbo].[OrderProducts] WITH CHECK ADD CONSTRAINT [FK\_OrderProducts\_Products\_ProductId] FOREIGN KEY([ProductId])

REFERENCES [dbo].[Products] ([Id])

ON DELETE CASCADE

GO

ALTER TABLE [dbo].[OrderProducts] CHECK CONSTRAINT [FK\_OrderProducts\_Products\_ProductId]

GO

ALTER TABLE [dbo].[Orders] WITH CHECK ADD CONSTRAINT [FK\_Orders\_AspNetUsers\_UserId] FOREIGN KEY([UserId])

REFERENCES [dbo].[AspNetUsers] ([Id])

ON DELETE CASCADE

GO

ALTER TABLE [dbo].[Orders] CHECK CONSTRAINT [FK\_Orders\_AspNetUsers\_UserId]

GO

ALTER TABLE [dbo].[Orders] WITH CHECK ADD CONSTRAINT [FK\_Orders\_Stocks\_StockId] FOREIGN KEY([StockId])

REFERENCES [dbo].[Stocks] ([Id])

GO

ALTER TABLE [dbo].[Orders] CHECK CONSTRAINT [FK\_Orders\_Stocks\_StockId]

GO

ALTER TABLE [dbo].[OrdersDelivery] WITH CHECK ADD CONSTRAINT [FK\_OrdersDelivery\_Orders\_OrderId] FOREIGN KEY([OrderId])

REFERENCES [dbo].[Orders] ([Id])

ON DELETE CASCADE

GO

ALTER TABLE [dbo].[OrdersDelivery] CHECK CONSTRAINT [FK\_OrdersDelivery\_Orders\_OrderId]

GO

ALTER TABLE [dbo].[Sales] WITH CHECK ADD CONSTRAINT [FK\_Sales\_Orders\_OrderId] FOREIGN KEY([OrderId])

REFERENCES [dbo].[Orders] ([Id])

ON DELETE CASCADE

GO

ALTER TABLE [dbo].[Sales] CHECK CONSTRAINT [FK\_Sales\_Orders\_OrderId]

GO

ALTER TABLE [dbo].[Sales] WITH CHECK ADD CONSTRAINT [FK\_Sales\_Stocks\_StockId] FOREIGN KEY([StockId])

REFERENCES [dbo].[Stocks] ([Id])

ON DELETE CASCADE

GO

ALTER TABLE [dbo].[Sales] CHECK CONSTRAINT [FK\_Sales\_Stocks\_StockId]

GO

ALTER TABLE [dbo].[StockProducts] WITH CHECK ADD CONSTRAINT [FK\_StockProducts\_Products\_ProductId] FOREIGN KEY([ProductId])

REFERENCES [dbo].[Products] ([Id])

ON DELETE CASCADE

GO

ALTER TABLE [dbo].[StockProducts] CHECK CONSTRAINT [FK\_StockProducts\_Products\_ProductId]

GO

ALTER TABLE [dbo].[StockProducts] WITH CHECK ADD CONSTRAINT [FK\_StockProducts\_Stocks\_StockId] FOREIGN KEY([StockId])

REFERENCES [dbo].[Stocks] ([Id])

ON DELETE CASCADE

GO

ALTER TABLE [dbo].[StockProducts] CHECK CONSTRAINT [FK\_StockProducts\_Stocks\_StockId]

GO

**Вывод**: в ходе выполнения практической был описан процесс развертывания программного средства.