

**Университет ИТМО**

**Факультет инфокоммуникационных технологий**

**Дисциплина:**

«ПРОЕКТИРОВАНИЕ И РЕАЛИЗАЦИЯ БАЗ ДАННЫХ»

**ОТЧЕТ ПО ЛАБОРАТОРНОЙ РАБОТЕ №1**

«Создание таблиц базы данных POSTGRESQL. Заполнение таблиц рабочими данными»

**Вариант 19**

Специальность:

09.03.03 Мобильные и сетевые технологии

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Оценка \_\_\_\_\_

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1. **Цель работы:** овладеть практическими навыками создания таблиц базы данных PostgreSQL 1X, заполнения их рабочими данными, резервного копирования и восстановления БД.

**Оборудование:** компьютерный класс.

**Программное обеспечение:** СУБД PostgreSQL 1X, pgAdmin 4.

## 2. Практическое задание:

1. Создать базу данных с использованием pgAdmin 4 (согласно индивидуальному заданию).
2. Создать схему в составе базы данных.
3. Создать таблицы базы данных.
4. Установить ограничения на данные: *Primary Key, Unique, Check, Foreign Key*.
5. Заполнить таблицы БД рабочими данными.
6. Создать резервную копию БД.

Указание:

Создать две резервные копии:

- с расширением *CUSTOM* для восстановления БД;
- с расширением *PLAIN* для листинга (в отчете);
- при создании резервных копий БД настроить параметры *Dump options* для *Type of objects* и *Queries*.

1. Восстановить БД.

## 3. Ход работы:

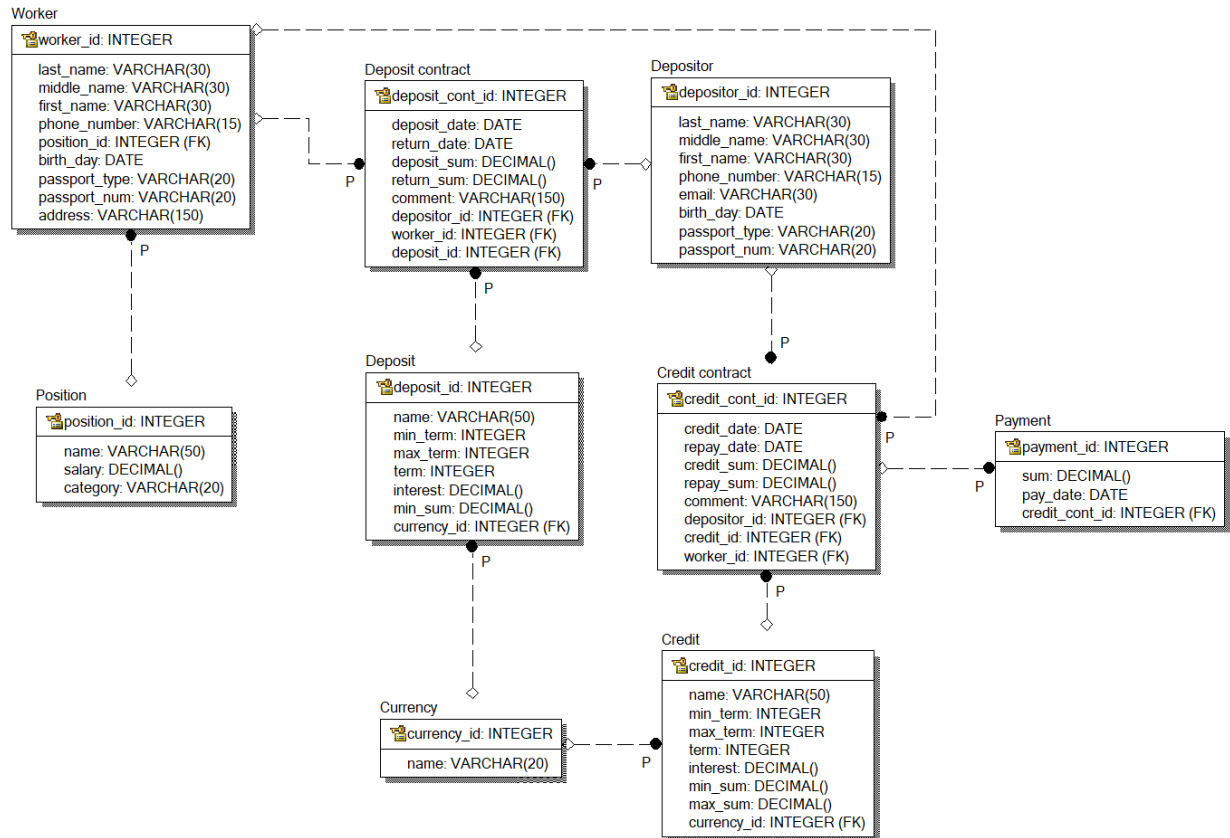
### Индивидуальное задание (19 вариант)

#### Вариант 19. БД «Банк»

Описание предметной области: Клиенты банка имеют вклады и кредиты различных видов. Сотрудники банка заключают договоры с клиентами. Ежемесячно начисляется процент по вкладу, и полученная сумма добавляется к сумме вклада заказчика. Вкладчик имеет право снимать проценты по вкладу или всю сумму вклада с процентами по истечении срока вклада. При снятии денег до истечения срока вклада процент за текущий месяц не начисляется. Кредит выдается на определенный срок. Формируется схема выплаты. Хранится информация по ежемесячным выплатам.

БД должна содержать следующий минимальный набор сведений: ФИО сотрудника. Возраст сотрудника. Адрес сотрудника. № телефона сотрудник. Паспортные данные сотрудника. Должность сотрудника. Оклад сотрудника (зависит от категории). Наименование вклада. Минимальный срок вклада. Минимальная сумма вклада. Процент по вкладу. Срок вклада. Процентная ставка. Код валюты. Наименование валюты. ФИО вкладчика. Адрес вкладчика. Телефон вкладчика. Е-mail вкладчика. Паспортные данные. Номер договора. Дата вклада. Дата возврата. Сумма вклада. Сумма возврата. Данные по кредиту.

## ER-диаграмма:



## Создание базы данных:

Create - Database

General

Definition

Security

Parameters

Advanced

SQL

Database

БАНК

Owner

postgres


Comment

Close

Reset

Save

### Создание схемы:



General

Security


Default privileges

SQL



Name

default

Owner


 postgres | v

Comment

Close

Reset

 Save





















Создание таблиц:

Worker

Create - Table

GeneralColumnsAdvancedConstraintsPartitionsParametersSecuritySQL

Columns

	Name	Data type	Length/Precision	Scale	Not NULL?	Primary key?	Default
 	worker_id	integer			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
 	last_name	character varyi...	30		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
 	middle_name	character varyi...	30		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
 	first_name	character varyi...	30		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
 	phone_numb	character varyi...	15		<input type="checkbox"/>	<input type="checkbox"/>	
 	passport_typ	character varyi...	20		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
 	passport_nur	character varyi...	20		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
 	birth_day	date			<input checked="" type="checkbox"/>	<input type="checkbox"/>	
 	address	character varyi...	150		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
 	position_id	integer			<input checked="" type="checkbox"/>	<input type="checkbox"/>	

i?

CloseResetSave

Worker

General

Columns

Advanced

Constraints

Parameters

Security

SQL

Name

Columns

Referenced Table

position\_id

(position\_id) -> (position\_id)

"default"."Position"

General

Definition

Columns

Action

Columns

Local column

Select an item...

References

"default"."Position"

Referencing

Select an item...

Add

Local

Referenced

Referenced Table

position\_id

position\_id

"default"."Position"

Close

Reset

Save

Worker

General

Columns

Advanced

Constraints

Parameters

Security

SQL

Primary Key

Foreign Key

Check

Unique

Exclude

Name

Check

passport\_type

passport\_type in ("RU", "EU", "USA", "Other")

General

Definition

Check

passport\_type in ("RU", "EU", "USA", "Other")

No inherit?

Don't validate?

Close

Reset

Save









## Position

Create - Table ↗ ✕

General Columns Advanced Constraints Partitions Parameters Security SQL

Inherited from table(s) Select to inherit from... ⌵

















Columns +

	Name	Data type	Length/Precision	Scale	Not NULL?	Primary key?	Default
 	position_id	integer <span>⌵</span>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="text"/>
 	name	character varyi... <span>⌵</span>	50	<input type="text"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
 	salary	double precisi... <span>⌵</span>			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
 	category	character varyi... <span>⌵</span>	20	<input type="text"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>

i ? ✕ Close ↺ Reset 💾 Save

## Depositor

Columns +

	Name	Data type	Length/Precision	Scale	Not NULL?	Primary key?	Default
 	deposit_id	integer <span>⌵</span>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="text"/>
 	min_term	integer <span>⌵</span>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
 	max_term	integer <span>⌵</span>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
 	term	integer <span>⌵</span>			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
 	interest	integer <span>⌵</span>			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
 	min_sum	integer <span>⌵</span>			<input type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
 	currency_id	integer <span>⌵</span>			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>
 	name	character varyi... <span>⌵</span>	30	<input type="text"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="text"/>

Create - Table

General

Columns

Advanced

Constraints

Partitions

Parameters

Security

SQL

Primary Key

Foreign Key

Check

Unique

Exclude

Name

above\_than\_zero

Check

(min\_term, max\_term, term, interest, min\_sum) >

General

Definition

Check

(min\_term, max\_term, term, interest, min\_sum) > 0

No inherit?

Don't validate?

Close

Reset

Save

## Credit

Create - Table

General

Columns

Advanced

Constraints

Partitions

Parameters

Security

SQL

	Name	Data type	Length/Precision	Scale	Not NULL?	Primary key?	Default
<div></div>	credit_id	integer					
<div></div>	name	character varyi...	50				
<div></div>	min_term	integer					
<div></div>	max_term	integer					
<div></div>	term	integer					
<div></div>	interest	integer					
<div></div>	min_sum	integer					
<div></div>	max_sum	integer					
<div></div>	currency_id	integer					



Primary Key Foreign Key Check Unique Exclude

				+
		Name	Columns	Referenced Table
		Currency_idFK	(currency_id) -> (currency_id)	default.Currency

Primary Key Foreign Key Check Unique Exclude

			+
	Name	Check	
		above_zero	min_term > 0 AND max_term > 0 AND term > 0 AND

General Definition

Check

min\_term > 0 AND max\_term > 0 AND term > 0 AND min\_sum > 0 AND max\_sum > 0

No inherit?



## Deposit\_contract

Create - Table



General Columns Advanced Constraints Partitions Parameters Security SQL

	Name	Data type	Length/Precision	Scale	Not NULL?	Primary key?	Default
		deposit_cont	integer		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
		deposit_date	date		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		return_date	date		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		deposit_sum	integer		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		comment	character varyi...	150	<input type="checkbox"/>	<input type="checkbox"/>	
		worker_id	integer		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		depositor_id	integer		<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		deposit_id	integer		<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Primary Key Foreign Key Check Unique Exclude				
		Name	Columns	Referenced Table
		currency_idFK	(currency_id) -> (currency_id)	default.Currency
		depositor_idFK	(depositor_id) -> (deposit_id)	"default"."Depositor"
		deposit_idFK	(deposit_id) -> (deposit_id)	"default"."Deposit"
General Definition Columns Action				

Primary Key Foreign Key Check Unique Exclude				
		Name	Check	
		above_zero	deposit_sum > 0::double precision AND return_si	

**Credit\_contract**

Create - Table

↗ ✕

General

Columns

Advanced

Constraints

Partitions

Parameters

Security

SQL

	Name	Data type	Length/Precision	Scale	Not NULL?	Primary key?	Default
	credit_cont_i	integer			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	credit_date	date			<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	repay_date	date			<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	credit_sum	integer			<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	repay_sum	integer			<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	comment	character varyi...	150		<input type="checkbox"/>	<input type="checkbox"/>	
	worker_id	integer			<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	depositor_id	integer			<input checked="" type="checkbox"/>	<input type="checkbox"/>	
	credit_id	integer			<input checked="" type="checkbox"/>	<input type="checkbox"/>	

i ?

✕ Close

↺ Reset

💾 Save

General

Columns

Advanced

Constraints

Partitions

Parameters

Security

SQL

Primary Key

Foreign Key

Check

Unique

Exclude

+			
	Name	Columns	Referenced Table
	credit_id	(credit_id) -> (credit_id)	"default"."Credit"
	depositor_idFK	(depositor_id) -> (deposit_id)	"default"."Depositor"
	worker_idFK	(worker_id) -> (worker_id)	"default"."Worker"

## Payment

Create - Table









General
Columns
Advanced
Constraints
Partitions
Parameters
Security
SQL



Inherited from table(s)

Select to inherit from...

Columns

+

	Name	Data type	Length/Precision	Scale	Not NULL?	Primary key?	Default
 	payment_id	integer   <div></div>			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<div></div>
 	sum	integer   <div></div>			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<div></div>
 	pay_date	date   <div></div>			<input type="checkbox"/>	<input type="checkbox"/>	<div></div>
 	credit_cont_i	integer   <div></div>			<input checked="" type="checkbox"/>	<input type="checkbox"/>	<div></div>

Close

Reset

Save

Payment

General
Columns
Advanced
Constraints
Parameters
Security
SQL

Primary Key



Foreign Key

Check

Unique

Exclude

+

	Name	Columns	Referenced Table
 	credit_cont_id	(credit_cont_id) -> (credit_id)	"default"."Credit"

General

Definition

Columns

Action

Columns

Primary Key



Foreign Key

Check

Unique

Exclude

+

	Name	Check
 	above_zero	sum > 0

General

Definition

## Deposit

Deposit

General

Columns

Advanced

















Constraints

Parameters

Security

SQL

Columns

	Name	Data type	Length/Precision	Scale	Not NULL?	Primary key?	Default
 	deposit_id	integer   v			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
 	min_term	integer   v			<input type="checkbox"/>	<input type="checkbox"/>	
 	max_term	integer   v			<input type="checkbox"/>	<input type="checkbox"/>	
 	term	integer   v			<input checked="" type="checkbox"/>	<input type="checkbox"/>	
 	interest	integer   v			<input checked="" type="checkbox"/>	<input type="checkbox"/>	
 	min_sum	integer   v			<input type="checkbox"/>	<input type="checkbox"/>	
 	currency_id	integer   v			<input checked="" type="checkbox"/>	<input type="checkbox"/>	
 	name	Select an item...   v	30		<input checked="" type="checkbox"/>	<input type="checkbox"/>	

Deposit

General

Columns

Advanced

Constraints

Parameters

Security

SQL



Primary Key

Foreign Key

Check

Unique

Exclude

	Name	Columns	Referenced Table
 	currency_id	(currency_id) -> (currency_id)	"default"."Currency"

General

Definition

Columns

Action





## Currency



Create - Table

General Columns Advanced Constraints Partitions Parameters Security SQL

Inherited from table(s) Select to inherit from...

Columns

	Name	Data type	Length/Precision	Scale	Not NULL?	Primary key?	Default
 	currency_id	integer			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
 	name	character varyi...	20		<input checked="" type="checkbox"/>	<input type="checkbox"/>	



Close Reset Save



## Credit

Credit

General Columns Advanced Constraints Parameters Security SQL

Primary Key Foreign Key Check Unique Exclude

Foreign Key

	Name	Columns	Referenced Table
 	Currency_idFK	(currency_id) -> (currency_id)	"default"."Currency"

## Пример скрипта для заполнения тестовыми данными

Name	Value
Updated Rows	1
Query	insert into "Worker" (worker_id, last_name, middle_name, first_na... passport_type, passport_num, birth_day, address, position_id) valu... (1, '{Zubenko}', '{Dmitrievna}', '{Alla}', '{+79063842299}', '{RU}', '{12... '{Вяземский 5}', null)
Finish time	Wed Mar 30 19:39:25 MSK 2022

## Таблица deposit\_contract

Свойства Данные Диаграмма							
Bank Базы данных Bank Схемы default Таблицы Depos							
Deposit_contract Введите SQL выражение чтобы отфильтровать результат							
аблица	return_date	123 deposit_sum	123 return_sum	comment	123 worker_id	123 depositor_ic	
1	2023-02-20	100 000	170 000	NULL	1	1	

### Пример скрипта из бэкапа Plain:

1. pg\_dump: last built-in OID is 16383
2. pg\_dump: reading extensions
3. pg\_dump: identifying extension members
4. pg\_dump: reading schemas
5. pg\_dump: reading user-defined tables
6. pg\_dump: reading user-defined functions
7. pg\_dump: reading user-defined types
8. pg\_dump: reading procedural languages
9. pg\_dump: reading user-defined aggregate functions
10. pg\_dump: reading user-defined operators
11. pg\_dump: reading user-defined access methods
12. pg\_dump: reading user-defined operator classes
13. pg\_dump: reading user-defined operator families
14. pg\_dump: reading user-defined text search parsers
15. pg\_dump: reading user-defined text search templates
16. pg\_dump: reading user-defined text search dictionaries
17. pg\_dump: reading user-defined text search configurations
18. pg\_dump: reading user-defined foreign-data wrappers
19. pg\_dump: reading user-defined foreign servers
20. pg\_dump: reading default privileges
21. pg\_dump: reading user-defined collations
22. pg\_dump: reading user-defined conversions
23. pg\_dump: reading type casts
24. pg\_dump: reading transforms
25. pg\_dump: reading table inheritance information
26. pg\_dump: reading event triggers
27. pg\_dump: finding extension tables
28. pg\_dump: finding inheritance relationships
29. pg\_dump: reading column info for interesting tables
30. pg\_dump: finding the columns and types of table "default.Credit"
31. pg\_dump: finding check constraints for table "default.Credit"
32. pg\_dump: finding the columns and types of table "default.Credit\_contract"
33. pg\_dump: finding the columns and types of table "default.Currency"
34. pg\_dump: finding the columns and types of table "default.Deposit"
35. pg\_dump: finding check constraints for table "default.Deposit"
36. pg\_dump: finding the columns and types of table "default.Deposit\_contract"
37. pg\_dump: finding check constraints for table "default.Deposit\_contract"
38. pg\_dump: finding the columns and types of table "default.Depositor"
39. pg\_dump: finding the columns and types of table "default.Payment"
40. pg\_dump: finding check constraints for table "default.Payment"
41. pg\_dump: finding the columns and types of table "default.Position"
42. pg\_dump: finding the columns and types of table "default.Worker"
43. pg\_dump: flagging inherited columns in subtables

44. pg\_dump: reading indexes
45. pg\_dump: reading indexes for table "default.Credit"
46. pg\_dump: reading indexes for table "default.Credit\_contract"
47. pg\_dump: reading indexes for table "default.Currency"
48. pg\_dump: reading indexes for table "default.Deposit"
49. pg\_dump: reading indexes for table "default.Deposit\_contract"
50. pg\_dump: reading indexes for table "default.Depositor"
51. pg\_dump: reading indexes for table "default.Payment"
52. pg\_dump: reading indexes for table "default.Position"
53. pg\_dump: reading indexes for table "default.Worker"
54. pg\_dump: flagging indexes in partitioned tables
55. pg\_dump: reading extended statistics
56. pg\_dump: reading constraints
57. pg\_dump: reading foreign key constraints for table "default.Credit"
58. pg\_dump: reading foreign key constraints for table "default.Credit\_contract"
59. pg\_dump: reading foreign key constraints for table "default.Currency"
60. pg\_dump: reading foreign key constraints for table "default.Deposit"
61. pg\_dump: reading foreign key constraints for table "default.Deposit\_contract"
62. pg\_dump: reading foreign key constraints for table "default.Depositor"
63. pg\_dump: reading foreign key constraints for table "default.Payment"
64. pg\_dump: reading foreign key constraints for table "default.Position"
65. pg\_dump: reading foreign key constraints for table "default.Worker"
66. pg\_dump: reading triggers
67. pg\_dump: reading triggers for table "default.Credit"
68. pg\_dump: reading triggers for table "default.Credit\_contract"
69. pg\_dump: reading triggers for table "default.Currency"
70. pg\_dump: reading triggers for table "default.Deposit"
71. pg\_dump: reading triggers for table "default.Deposit\_contract"
72. pg\_dump: reading triggers for table "default.Depositor"
73. pg\_dump: reading triggers for table "default.Payment"
74. pg\_dump: reading triggers for table "default.Position"
75. pg\_dump: reading triggers for table "default.Worker"
76. pg\_dump: reading rewrite rules
77. pg\_dump: reading policies
78. pg\_dump: reading row-level security policies
79. pg\_dump: reading publications
80. pg\_dump: reading publication membership
81. pg\_dump: reading subscriptions
82. pg\_dump: reading large objects
83. pg\_dump: reading dependency data
84. pg\_dump: saving encoding = UTF8
85. pg\_dump: saving standard\_conforming\_strings = on
86. pg\_dump: saving search\_path =
87. pg\_dump: creating SCHEMA "default"
88. pg\_dump: creating TABLE "default.Credit"
89. pg\_dump: creating TABLE "default.Credit\_contract"
90. pg\_dump: creating TABLE "default.Currency"
91. pg\_dump: creating TABLE "default.Deposit"
92. pg\_dump: creating TABLE "default.Deposit\_contract"
93. pg\_dump: creating TABLE "default.Depositor"
94. pg\_dump: creating TABLE "default.Payment"
95. pg\_dump: creating TABLE "default.Position"
96. pg\_dump: creating TABLE "default.Worker"
97. pg\_dump: processing data for table "default.Credit"
98. pg\_dump: dumping contents of table "default.Credit"
99. pg\_dump: processing data for table "default.Credit\_contract"
100. pg\_dump: dumping contents of table "default.Credit\_contract"



```

101. pg_dump: processing data for table "default.Currency"
102. pg_dump: dumping contents of table "default.Currency"
103. pg_dump: processing data for table "default.Deposit"
104. pg_dump: dumping contents of table "default.Deposit"
105. pg_dump: processing data for table "default.Deposit_contract"
106. pg_dump: dumping contents of table "default.Deposit_contract"
107. pg_dump: processing data for table "default.Depositor"
108. pg_dump: dumping contents of table "default.Depositor"
109. pg_dump: processing data for table "default.Payment"
110. pg_dump: dumping contents of table "default.Payment"
111. pg_dump: processing data for table "default.Position"
112. pg_dump: dumping contents of table "default.Position"
113. pg_dump: processing data for table "default.Worker"
114. pg_dump: dumping contents of table "default.Worker"
115. pg_dump: creating CONSTRAINT "default.Credit Credit_pkey"
116. pg_dump: creating CONSTRAINT "default.Currency Currency_pkey"
117. pg_dump: creating CONSTRAINT "default.Deposit_contract Deposit_contract_pkey"
118. pg_dump: creating CONSTRAINT "default.Deposit Deposit_pkey"
119. pg_dump: creating CONSTRAINT "default.Depositor Depositor_pkey"
120. pg_dump: creating CONSTRAINT "default.Payment Payment_pkey"
121. pg_dump: creating CONSTRAINT "default.Position Position_pkey"
122. pg_dump: creating CONSTRAINT "default.Worker Worker_pkey"
123. pg_dump: creating CHECK CONSTRAINT "default.Deposit_contract above_zero"
124. pg_dump: creating CHECK CONSTRAINT "default.Credit above_zero"
125. pg_dump: creating CHECK CONSTRAINT "default.Payment above_zero"
126. pg_dump: creating CONSTRAINT "default.Credit_contract credit_cont_idPK"
127. pg_dump: creating FK CONSTRAINT "default.Credit Currency_idFK"
128. pg_dump: creating FK CONSTRAINT "default.Payment credit_cont_id"
129. pg_dump: creating FK CONSTRAINT "default.Credit_contract credit_id"
130. pg_dump: creating FK CONSTRAINT "default.Deposit currency_idFK"
131. pg_dump: creating FK CONSTRAINT "default.Deposit deposit_idFK"
132. pg_dump: creating FK CONSTRAINT "default.Deposit_contract deposit_idFK"
133. pg_dump: creating FK CONSTRAINT "default.Deposit depositor_idFK"
134. pg_dump: creating FK CONSTRAINT "default.Credit_contract depositor_idFK"
135. pg_dump: creating FK CONSTRAINT "default.Deposit_contract depositor_idFK"
136. pg_dump: creating FK CONSTRAINT "default.Worker position_id"
137. pg_dump: creating FK CONSTRAINT "default.Credit_contract worker_idFK"
138. pg_dump: creating FK CONSTRAINT "default.Deposit_contract worker_idFK"

```

**Вывод:** я ознакомилась с таким инструментом, как PgAdmin4. Мной была создана новая схема и база данных с таблицами, содержащими ограничения целостности (CHECK) и первичные/внешние ключи. Мной были сделаны 2 бэкапа (в формате Plain и Custom), также я успешно я восстановила базу данных.