

ФЕДЕРАЛЬНОЕ ГОСУДАРСТВЕННОЕ БЮДЖЕТНОЕ ОБРАЗОВАТЕЛЬНОЕ
УЧРЕЖДЕНИЕ ВЫСШЕГО ОБРАЗОВАНИЯ

**«САНКТ-ПЕТЕРБУРГСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ
ТЕЛЕКОММУНИКАЦИЙ**

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ОТЧЕТ

по практическому занятию №1

Тема: «Резервное копирование и восстановление»

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Отчет по резервному копированию

Описание предметной области

База данных описывает результаты полевых опытов сельскохозяйственного института, который изучает влияние предшественников и режимов ухода за почвой на урожайность зерновых культур в Новосибирской области. Для каждой культуры фиксируются поле, год, агротехнические условия и урожай, что позволяет анализировать эффективность технологий и подбирать оптимальные схемы севооборота. Система служит основой для отчетности, прогнозов и планирования ресурсов.

Схема базы данных

```
CREATE TABLE cultures (  
    id SERIAL PRIMARY KEY,  
    name TEXT UNIQUE  
);  
  
CREATE TABLE predecessors (  
    id SERIAL PRIMARY KEY,  
    name TEXT UNIQUE  
);  
  
CREATE TABLE conditions (  
    id SERIAL PRIMARY KEY,  
    name TEXT UNIQUE  
);  
  
CREATE TABLE experiments (  
    id SERIAL PRIMARY KEY,  
    year INT,  
    field INT,  
    culture_id INT REFERENCES cultures(id),  
    predecessor_id INT REFERENCES predecessors(id),  
    condition_id INT REFERENCES conditions(id),  
    yield NUMERIC(5,2)  
);
```

Примеры запросов на вставку данных

```
INSERT INTO cultures (name) VALUES ('Горох'), ('Овёс'), ('Пшеница'), ('Ячмень');  
INSERT INTO predecessors (name) VALUES ('Овёс'), ('Пар'), ('Пшеница'), ('Ячмень');  
INSERT INTO conditions (name) VALUES ('Без травы'), ('С травой');  
INSERT INTO experiments (year, field, culture_id, predecessor_id, condition_id, yield)  
VALUES (2015, 1, 1, 1, 2, 19.10),  
       (2015, 1, 4, 2, 1, 31.80),  
       (2015, 2, 4, 1, 2, 22.00),
```

```
(2015, 2, 1, 4, 2, 16.00);
```

Ход экспериментов по резервному копированию

Последовательный запуск `make run_all` выполняет сборку контейнера, все варианты резервного копирования и восстановление данных. Ниже приведен полный вывод, начиная с шага «Делаем резервное копирование данных в формате custom».

Резервное копирование в формате custom

```
/Applications/Xcode.app/Contents/Developer/usr/bin/make build
docker compose down -v && docker compose up -d --build
[+] Running 3/3
✓ Container postgres-db1      Removed
  ↳ 0.1s
✓ Volume 1_backup_pgdata1     Removed
  ↳ 0.0s
✓ Network 1_backup_default    Removed
  ↳ 0.2s
[+] Building 2.9s (10/10) FINISHED
=> [internal] load local bake definitions
  ↳ 0.0s
=> => reading from stdin 525B
  ↳ 0.0s
=> [internal] load build definition from Dockerfile
  ↳ 0.0s
=> => transferring dockerfile: 188B
  ↳ 0.0s
=> [internal] load metadata for docker.io/library/postgres:18.0-alpine
  ↳ 2.7s
=> [auth] library/postgres:pull token for registry-1.docker.io
  ↳ 0.0s
=> [internal] load .dockerignore
  ↳ 0.0s
=> => transferring context: 2B
  ↳ 0.0s
=> [internal] load build context
  ↳ 0.0s
=> => transferring context: 174B
  ↳ 0.0s
=> [1/2] FROM docker.io/library/postgres:18.0-alpine@sha256:48c8ad3a7284b82be4482a
  ↳ 52076d47d879fd6fb084a1cbfccbd551f9331b0e40      0.0s
=> => resolve docker.io/library/postgres:18.0-alpine@sha256:48c8ad3a7284b82be4482a
  ↳ 52076d47d879fd6fb084a1cbfccbd551f9331b0e40      0.0s
=> CACHED [2/2] COPY init/ /docker-entrypoint-initdb.d/
  ↳ 0.0s
```

```

=> exporting to image
  ↪ 0.0s
=> => exporting layers
  ↪ 0.0s
=> => exporting manifest
  ↪ sha256:14aa4934d3a2289ffac6ced2ff600abd3b425f643af013b0a9cd55cb858a7d7a
  ↪ 0.0s
=> => exporting config
  ↪ sha256:5be411ff2c7ab27bbce4e5dce2d69a6a94aa0a68b9c608140aabe8e70289c23c
  ↪ 0.0s
=> => exporting attestation manifest
  ↪ sha256:825ba994a161a134726b838f251ce44c4f76be35c05c8b3b550bd464a4366b1a
  ↪ 0.0s
=> => exporting manifest list
  ↪ sha256:38b78d4987957f41ffff507e62d22f0f75ed52de6932ee7232e05a3a0b2fbb54
  ↪ 0.0s
=> => naming to docker.io/library/1_backup-db1:latest
  ↪ 0.0s
=> => unpacking to docker.io/library/1_backup-db1:latest
  ↪ 0.0s
=> resolving provenance for metadata file
  ↪ 0.0s
[+] Running 4/4
✓ 1_backup-db1          Built
  ↪ 0.0s
✓ Network 1_backup_default Created
  ↪ 0.0s
✓ Volume 1_backup_pgdata1 Created
  ↪ 0.0s
✓ Container postgres-db1 Started
  ↪ 0.1s
/Applications/Xcode.app/Contents/Developer/usr/bin/make 1_backup_custom
./scripts/backup_custom.sh db1_custom.dump
Waiting for db1 to become ready...
Writing custom-format backup to
  ↪ /Users/ami/source/manipulate/1_BACKUP/backups/db1_custom.dump
Backup completed.

```

Проверка и изменение данных перед восстановлением

```

/Applications/Xcode.app/Contents/Developer/usr/bin/make 7_show_update_experiment
./scripts/show_update_experiment.sh
Waiting for db1 to become ready...
BEGIN

```

id	year	field	culture_id	predecessor_id	condition_id	yield
14	2015	7	3	3	1	28.30

```
(1 row)
UPDATE 1
 id | year | field | culture_id | predecessor_id | condition_id | yield
-----+-----+-----+-----+-----+-----+-----
 14 | 2025 |    7 |          3 |              3 |            1 | 28.30
(1 row)
```

Восстановление и проверка результата

```
COMMIT
/Applications/Xcode.app/Contents/Developer/usr/bin/make 2_restore_custom
./scripts/restore_custom.sh ./backups/db1_custom.dump
Waiting for db1 to become ready...
Restoring db1 from ./backups/db1_custom.dump
Restore completed.
/Applications/Xcode.app/Contents/Developer/usr/bin/make 8_show_experiment
./scripts/show_experiment.sh
Waiting for db1 to become ready...
 id | year | field | culture_id | predecessor_id | condition_id | yield
-----+-----+-----+-----+-----+-----+-----
 14 | 2015 |    7 |          3 |              3 |            1 | 28.30
(1 row)
```

Plain-бэкапы с различными Section

```
/Applications/Xcode.app/Contents/Developer/usr/bin/make 3_backup_sections
./scripts/backup_plain_sections.sh
Waiting for db1 to become ready...
Dumping pre-data section
Dumping data section
Dumping post-data section
Section-specific backups are stored in
↪ /Users/ami/source/manipulate/1_BACKUP/backups/plain_sections
/Applications/Xcode.app/Contents/Developer/usr/bin/make 3_sections_pre
./scripts/backup_plain_sections.sh pre-data
Waiting for db1 to become ready...
Dumping pre-data section
Section-specific backups are stored in
↪ /Users/ami/source/manipulate/1_BACKUP/backups/plain_sections
/Applications/Xcode.app/Contents/Developer/usr/bin/make 3_sections_data
./scripts/backup_plain_sections.sh data
Waiting for db1 to become ready...
Dumping data section
Section-specific backups are stored in
↪ /Users/ami/source/manipulate/1_BACKUP/backups/plain_sections
/Applications/Xcode.app/Contents/Developer/usr/bin/make 3_sections_post
./scripts/backup_plain_sections.sh post-data
```

```
Waiting for db1 to become ready...
Dumping post-data section
Section-specific backups are stored in
↳ /Users/ami/source/manipulate/1_BACKUP/backups/plain_sections
/Applications/Xcode.app/Contents/Developer/usr/bin/make 4_backup_types
```

Проверка влияния настроек Type of objects

```
./scripts/backup_plain_types.sh
Waiting for db1 to become ready...
Dumping schema-only script
Dumping data-only script
Type-specific backups are stored in
↳ /Users/ami/source/manipulate/1_BACKUP/backups/plain_types
/Applications/Xcode.app/Contents/Developer/usr/bin/make 4_type_schema
./scripts/backup_plain_types.sh schema
Waiting for db1 to become ready...
Dumping schema-only script
Type-specific backups are stored in
↳ /Users/ami/source/manipulate/1_BACKUP/backups/plain_types
/Applications/Xcode.app/Contents/Developer/usr/bin/make 4_type_data
./scripts/backup_plain_types.sh data
Waiting for db1 to become ready...
Dumping data-only script
Type-specific backups are stored in
↳ /Users/ami/source/manipulate/1_BACKUP/backups/plain_types
```

Резервная копия в формате Directory и восстановление

```
/Applications/Xcode.app/Contents/Developer/usr/bin/make 5_backup_directory
./scripts/backup_directory.sh
Waiting for db1 to become ready...
Creating directory-format backup at /Users/ami/source/manipulate/1_BACKUP/backups/d
↳ irectory/db1_directory_20251103_194226
[+] Copying 1/1
✓ postgres-db1 copy postgres-db1:/tmp/db1_directory_20251103_194226 to /Users/ami/
↳ source/manipulate/1_BACKUP/backups/directory/db1_directory_20251103_194226
↳ Copied0.0s
Directory backup stored at /Users/ami/source/manipulate/1_BACKUP/backups/directory/
↳ db1_directory_20251103_194226
/Applications/Xcode.app/Contents/Developer/usr/bin/make 6_restore_directory
./scripts/restore_directory.sh
Using latest directory backup: /Users/ami/source/manipulate/1_BACKUP/backups/direct
↳ ory/db1_directory_20251103_194226
Waiting for db1 to become ready...
Copying /Users/ami/source/manipulate/1_BACKUP/backups/directory/db1_directory_20251
↳ 103_194226 into container path /tmp/db1_directory_20251103_194226
```

[+] Copying 1/1

✓ postgres-db1 copy /Users/ami/source/manipulate/1_BACKUP/backups/directory/db1_directory_20251103_194226 to postgres-db1:/tmp/db1_directory_20251103_194226
↪ Copied0.0s

Restoring db1 from directory backup

Directory restore completed.