

Optimizing Queries



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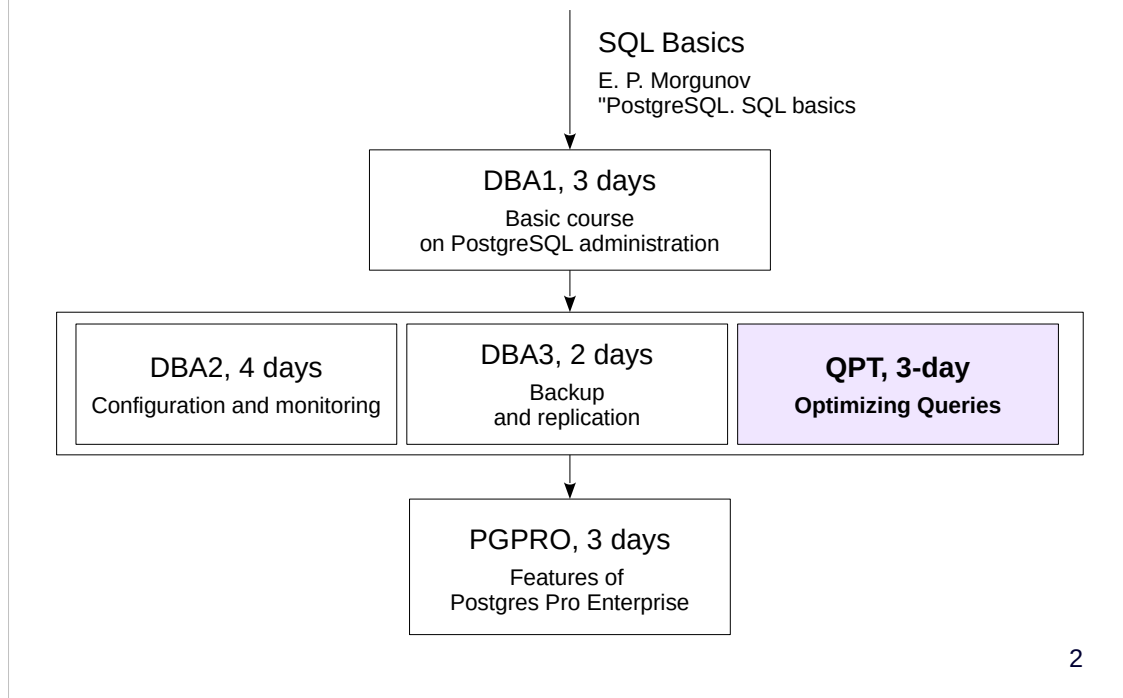
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Administrators



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To attend these courses, you need a basic understanding of the SQL language. Our curriculum doesn't include a dedicated SQL course, but there are many books and other resources available to help you master SQL. We recommend the book "PostgreSQL. SQL basics" by Evgeny Morgunov

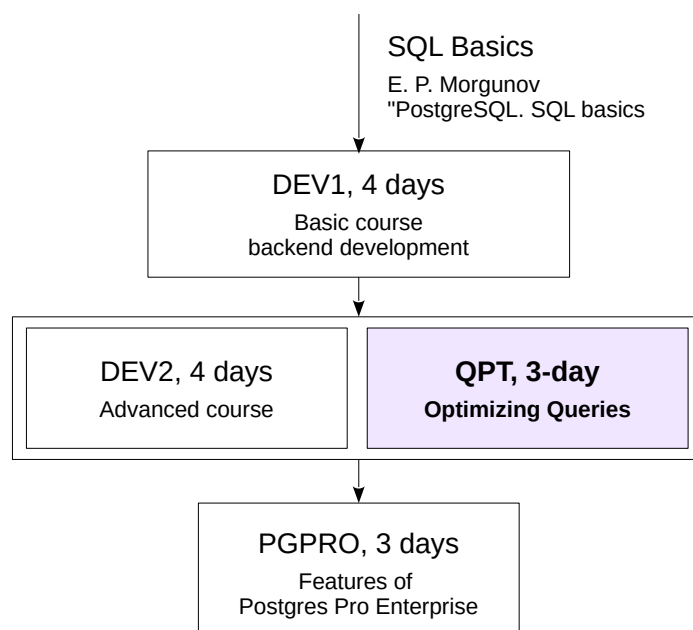
For administrators, we offer the following courses.

The **DBA1** course covers PostgreSQL architecture, installation, basic configuration, and server management. The course covers the key administrative tasks. The course provides an overview of access management, backup, and replication.

The **DBA2** course focuses on determining appropriate configuration parameters based on an understanding of the internals of the server. It also talks about monitoring the server and using feedback for iterative parameter tweaking. The course covers settings related to localization, extension management, and the server update process.

The **DBA3** covers backups, as well as configuration and usage scenarios of physical and logical replication. It also provides a general overview of how to build scalable high-availability clusters and discusses the related challenges.

This **QPT** course provides an in-depth look at query planning and execution mechanisms, explores instance parameter configuration related to performance, and covers techniques for identifying and optimizing problematic queries.



For backend developers, we offer a special range of courses.

The basic course is the **DEV1** course. It provides general information about the architecture of PostgreSQL and the use of basic database objects; server-side programming in SQL and PL/pgSQL languages using basic data types (including the composite type and arrays), as well as fronted interactions.

The **DEV2** course examines the features of the server's internal structure that affect the development of application code, and comprehensively discusses extensibility: the ability to extend server mechanisms with your own code, which allows you to use PostgreSQL to solve a wide variety of tasks.

The **PGPRO** course discusses additional features provided by the Postgres Pro Enterprise DBMS.

The **QPT** and **PGPRO** courses are intended for both developers and administrators.

DBA courses can be interesting to developers if they would like to deepen their knowledge of PostgreSQL internals, or if there is no separate administrator role in their project.

About the QPT Course



Duration: 3 days

Background knowledge required

- Familiarity with the Unix operating system

- Solid SQL skills (familiarity with PL/pgSQL is not required, but helpful)

- PostgreSQL as covered in the DBA1 or DEV1 course

Knowledge and skills gained

- In-depth understanding of query planning and execution processes

- Configuring instance parameters related to performance

- Identifying and optimizing problematic queries

Provided Resources



Pre-configured virtual machine

- Xubuntu 24.04 Operating System
- PostgreSQL 16 with Russian documentation
- Demo database "Air Transport"
- DBeaver

Course handouts

- Student's guide
- presentations, demonstrations, practical assignments and assignment keys (in html and pdf)
- Demonstration Database Schema

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If you are taking the course on your own, start with the Student's guide.

Among other things, it shows where to download and how to use the virtual machine and other materials.

All course materials are available at:

<https://postgrespro.com/docs/postgresql/16/sql-copy>

Completing practical assignments is very important to gain the basic skills in working with PostgreSQL. Be sure to try to complete the assignments yourself first, and then review the provided keys, even if the assignment did not raise questions. Assignment keys may contain additional information that is not mentioned in presentations and demonstrations.

Course handouts (presentations, demonstrations, practical assignments and keys) are available in two formats. html is good for browsing and copying code snippets. pdf is divided into pages and is easy to print.

Additional reference materials will help you quickly find the information you need.

DBeaver is installed on the virtual machine. Although we use psql throughout the course, you can use this GUI tool if you like.

Course outline and schedule



Each training day is approximately 8 academic hours + lunch (1 hour)

Each topic usually consists of

- a presentation with demos: ~25-60 min

- practical assignments: ~20-30 min, including a break

Demonstration database

01. Aviation

Query execution

02. Planning and execution

Data Access

03. 03. Access Methods

04. 04. Parallel Data Access

Access Methods (Continued)

05. 05. Index Types

Sorting and Grouping

06. Sorting

07. 07. Grouping

Join Methods

08. Nested loop join

09. Hash join

10. Merge join

Statistics

- 11. Basic statistics
- 12. Advanced Statistics

Query performance tuning

- 13. Profiling
- 14. Materialization
- 15. Functions
- 16. 16. Configuration Approaches