

Server-Side Application Development A Basic Course



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Usage of Course Materials

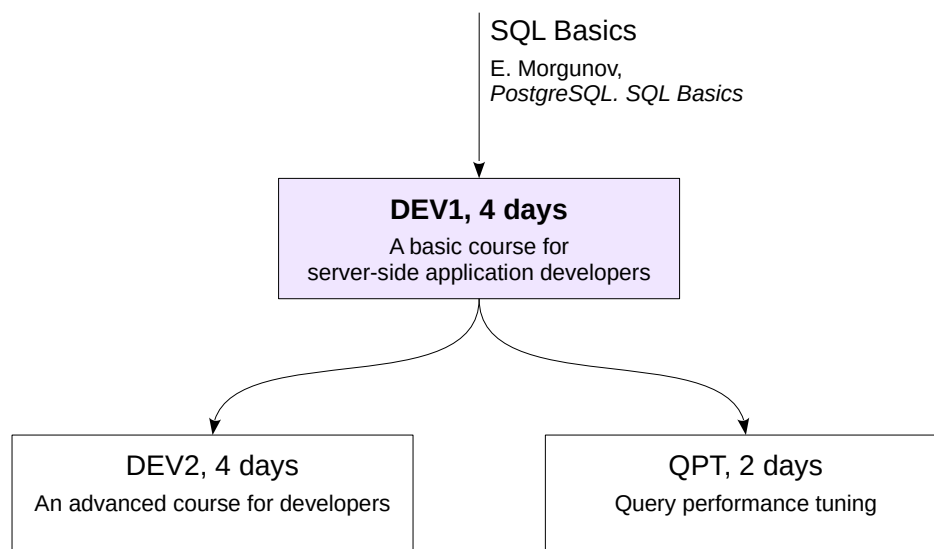
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We offer several courses for server-side application developers.

All these courses require background knowledge of SQL fundamentals. We do not have a special course on SQL, but there are a lot of books and other resources that can help you learn it. We can recommend a book by Evgeny Morgunov called *PostgreSQL. SQL Basics* (available in Russian):

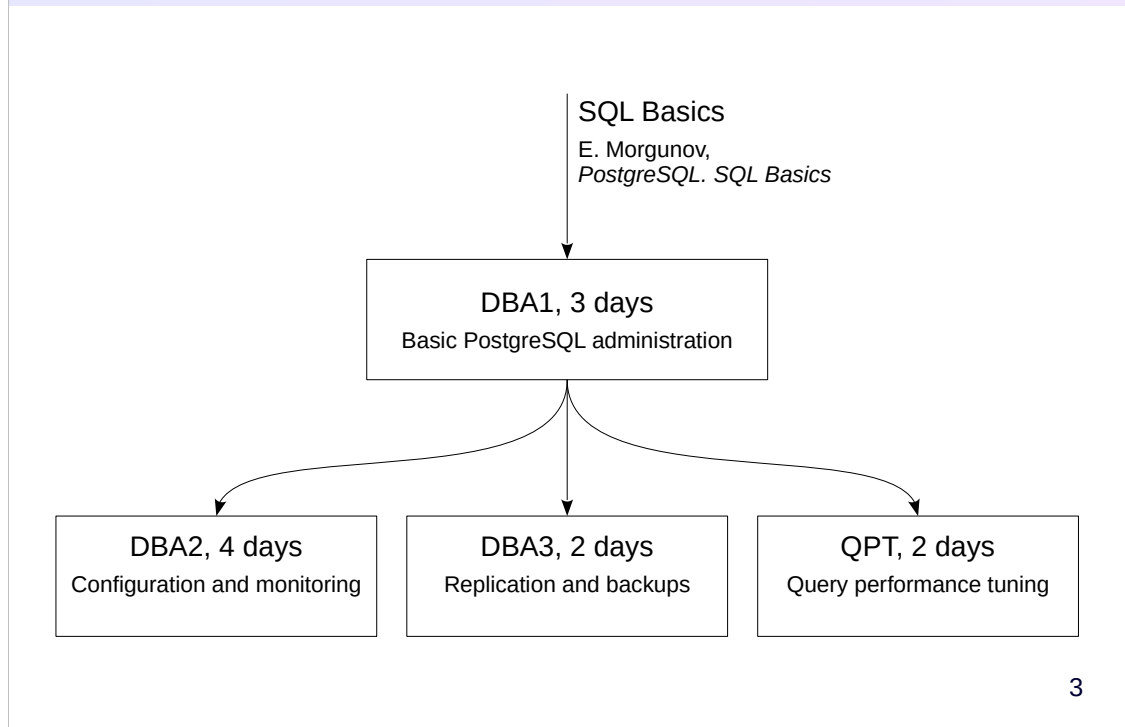
<https://postgrespro.ru/education/books/sqlprimer>

DEV1 is a basic course for developers.

DEV2 expands on specifics of server internals that should be taken into account in application code. It also thoroughly discusses extensibility—the ability to extend server mechanisms with your own code, which makes PostgreSQL suitable for a wide variety of tasks.

The QPT course provides a detailed review of query planning and execution, performance tuning of the server instance, as well as tracing and optimizing slow queries.

<https://postgrespro.ru/education/courses>



For DBAs, we offer the following courses.

The basic DBA1 course provides general information about PostgreSQL architecture, installation process, basic server configuration and management. It covers the main database administration tasks and access control, as well as provides an overview of replication and backup.

DBA2 explains how to set up various configuration parameters based on the understanding of server internals; it also discusses the questions of database monitoring and iterative tuning of PostgreSQL configuration based on the collected data. Besides, it touches upon localization settings, extension management, and server upgrades.

The DBA3 course 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.

The QPT course is common for both developers and DBAs.

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 DEV1



Duration: 4 days

Background knowledge required

- SQL fundamentals
- experience with any procedural programming language
- basic knowledge of Unix OS

Knowledge and skills gained

- general information about PostgreSQL architecture
- working with the main database objects: tables, indexes, views
- programming in SQL and PL/pgSQL on the server side
- using the main data types, including records and arrays
- setting up client-server communication

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This basic course introduces server-side application developers to PostgreSQL fundamentals and writing stored procedures and functions in SQL and PL/pgSQL.

Provided Resources



A pre-configured virtual machine

- Xubuntu OS
- PostgreSQL 12 with documentation in English
- a sample web application Bookstore
- pgAdmin 4

Course materials

- Student's Guide
- presentations, demos, practical assignments with keys (in html and pdf formats)
- reference materials: PostgreSQL functions and data types, a chart of the main system catalog tables with psql commands, some Unix commands

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If you are taking the course on your own, take a look at the Student's Guide first. Among other things, it provides download links for the virtual machine and other resources, and explains how to use them. All course materials are available at:

<https://postgrespro.com/education/courses/DEV1>

Doing practical assignments is very important for gaining the skills of working with PostgreSQL. Always try completing the tasks on your own, and then look through the provided keys, even if you did not have any questions: you can find there some more theory, which is not covered in presentations and demos.

Course materials (presentations, demos, practical assignments, and their keys) are available in two formats. The html format is convenient for browsing online and allows copying text and code snippets. The pdf format works best for printing.

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

There is pgAdmin 4 installed on the virtual machine. Although we use psql throughout the course, you can try this GUI tool if you like.

Organizational Questions



Each course day includes

- ~8 classroom hours (45 min each)
- a lunch break (1 hour)

For each lecture, we usually provide

- a presentation with demos: ~25–60 min
- practical assignments: ~20–30 min, including a break

Basic tools

- 01. Installation and management; psql

Architecture

- 02. A general overview of PostgreSQL
- 03. Isolation and MVCC
- 04. Buffer cache and WAL

Data organization

- 05. Logical structure
- 06. Physical structure

In the first day, we mainly cover theoretical questions. We present PostgreSQL architecture fundamentals, which is indispensable for efficient use of database features. The gained knowledge will be applied to practice in the upcoming days.

Bookstore application

07. Application schema and interface

SQL

08. Functions

09. Procedures

10. Composite types

PL/pgSQL

11. Overview and programming structures

Starting from the second day, there are two sets of practical assignments for each topic: the tasks related to the Bookstore application and some additional ones. It is impossible to complete all the practice within the allotted time (about 30 minutes). Use additional tasks for self-study.

PL/pgSQL (continued)

- 12. Executing queries
- 13. Cursors
- 14. Dynamic commands
- 15. Arrays
- 16. Error handling

PL/pgSQL (continued)

17. Triggers

18. Debugging

Access control

19. Access control overview

Backup

20. Logical backup