

POSTGRESQL - QUICK GUIDE

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POSTGRESQL OVERVIEW

PostgreSQL is a powerful, open source object-relational database system. It has more than 15 years of active development and a proven architecture that has earned it a strong reputation for reliability, data integrity, and correctness.

This tutorial will give you quick start with PostgreSQL and make you comfortable with PostgreSQL programming.

What is PostgreSQL?

PostgreSQL (pronounced as **post-gress-Q-L**) is an open source relational database management system (DBMS) developed by a worldwide team of volunteers. PostgreSQL is not controlled by any corporation or other private entity and the source code is available free of charge.

Key features of PostgreSQL

PostgreSQL runs on all major operating systems, including Linux, UNIX (AIX, BSD, HP-UX, SGI IRIX, Mac OS X, Solaris, Tru64), and Windows. It supports text, images, sounds, and video, and includes programming interfaces for C / C++, Java, Perl, Python, Ruby, Tcl and Open Database Connectivity (ODBC).

PostgreSQL supports a large part of the SQL standard and offers many modern features including the following:

- Complex SQL queries
- SQL Sub-selects
- Foreign keys
- Trigger
- Views
- Transactions
- Multiversion concurrency control (MVCC)
- Streaming Replication (as of 9.0)
- Hot Standby (as of 9.0)

You can check official documentation of PostgreSQL to understand above-mentioned features. PostgreSQL can be extended by the user in many ways, for example by adding new:

- Data types
- Functions
- Operators
- Aggregate functions
- Index methods

Procedural Languages Support

PostgreSQL supports four standard procedural languages which allows the users to write their own code in any of the languages and it can be executed by PostgreSQL database server. These procedural languages are - PL/pgSQL, PL/Tcl, PL/Perl and PL/Python. Besides, other non-standard procedural languages like PL/PHP, PL/V8, PL/Ruby, PL/Java, etc., are also supported.

POSTGRESQL ENVIRONMENT SETUP

To start understanding the PostgreSQL basics, first let's install the PostgreSQL. This chapter explains about installing the PostgreSQL on Linux, Windows and Mac OS platforms.

Installing PostgreSQL on Linux/Unix

Follow the following steps to install PostgreSQL on your Linux machine. Make sure you are logged in as **root** before you proceed for the installation.

- Pick the version number of PostgreSQL you want and, as exactly as possible, the platform you want from a [EnterpriseDB](#)
- I downloaded **postgresql-9.2.4-1-linux-x64.run** for my 64 bit CentOS-6 machine. Now, let's execute it as follows:

```
[root@host]# chmod +x postgresql-9.2.4-1-linux-x64.run
[root@host]# ./postgresql-9.2.4-1-linux-x64.run
```

```
-----
Welcome to the PostgreSQL Setup Wizard.
```

```
-----
Please specify the directory where PostgreSQL will be installed.
```

```
Installation Directory [/opt/PostgreSQL/9.2]:
```

- Once you launch the installer, it asks you few basic questions like location of the installation, password of the user, who will use database, port number, etc. So keep all of them at their default values except password, which you can provide password as per your choice. It will install PostgreSQL at your Linux machine and will display the following message:

```
Please wait while Setup installs PostgreSQL on your computer.
```

```
Installing
```

```
0% _____ 50% _____ 100%
```

```
#####
```

```
-----
Setup has finished installing PostgreSQL on your computer.
```

- Follow the following post-installation steps to create your database:

```
[root@host]# su - postgres
Password:
bash-4.1$ createdb testdb
bash-4.1$ psql testdb
psql (8.4.13, server 9.2.4)
test=#
```

- You can start/restart postgres server in case it is not running using the following command:

```
[root@host]# service postgresql restart
Stopping postgresql service:      [ OK ]
Starting postgresql service:      [ OK ]
```

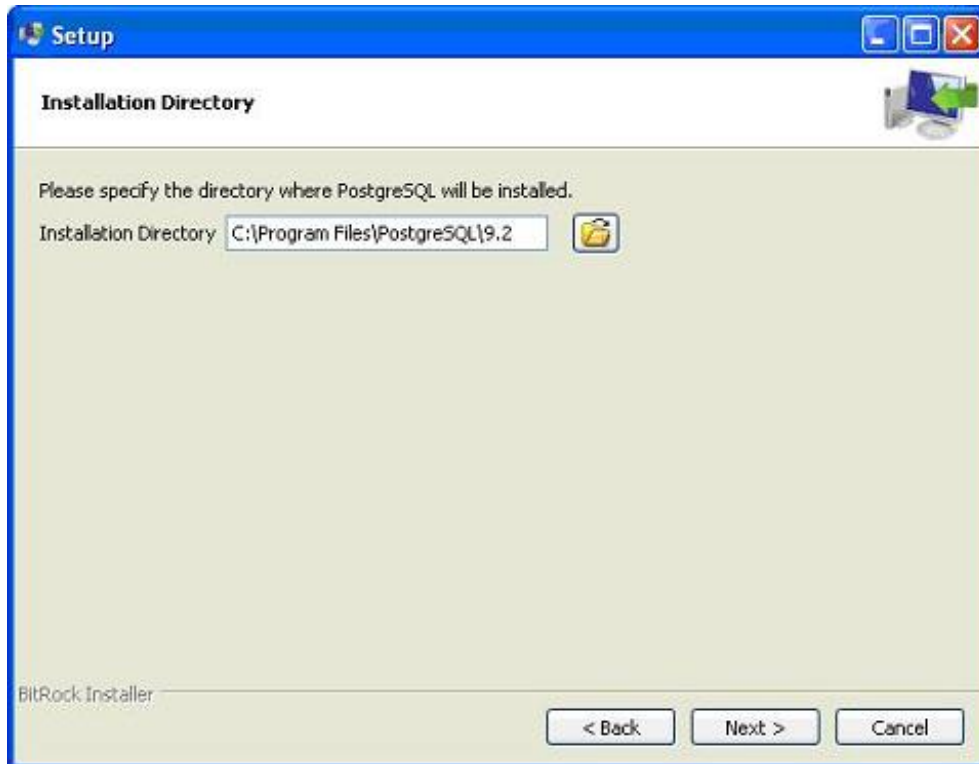
If your installation was correct, you will have PostgreSQL prompt **test=#** shown above.

Installing PostgreSQL on Windows

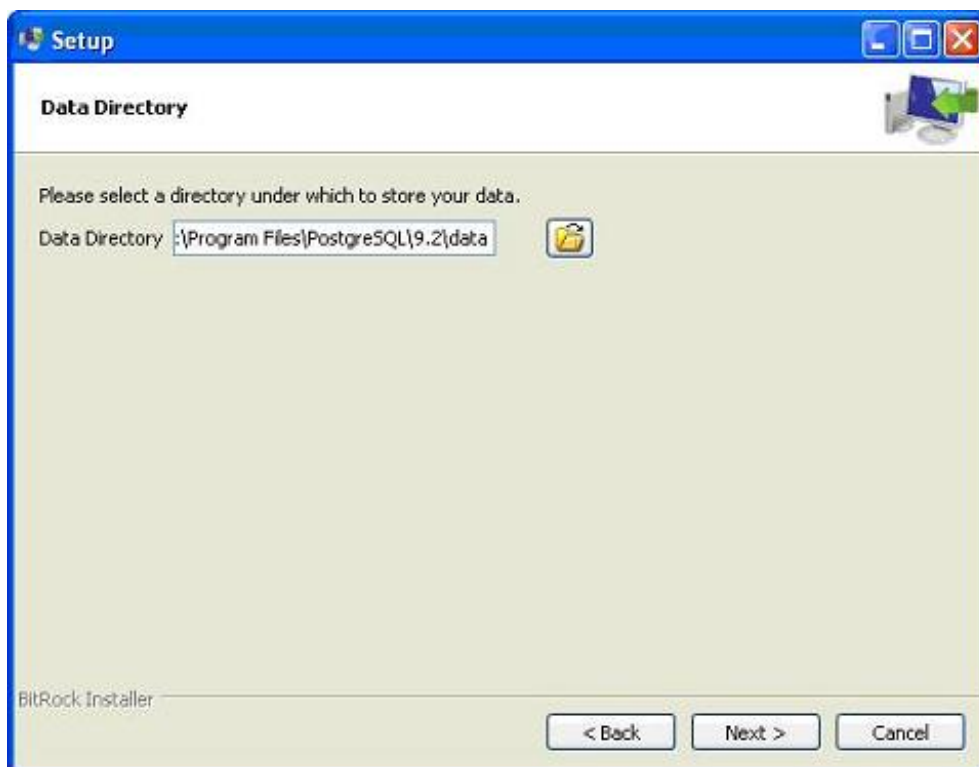
Follow the following steps to install PostgreSQL on your Windows machine. Make sure you have turned Third Party Antivirus off while installing.

- Pick the version number of PostgreSQL you want and, as exactly as possible, the platform you want from a [EnterpriseDB](#)

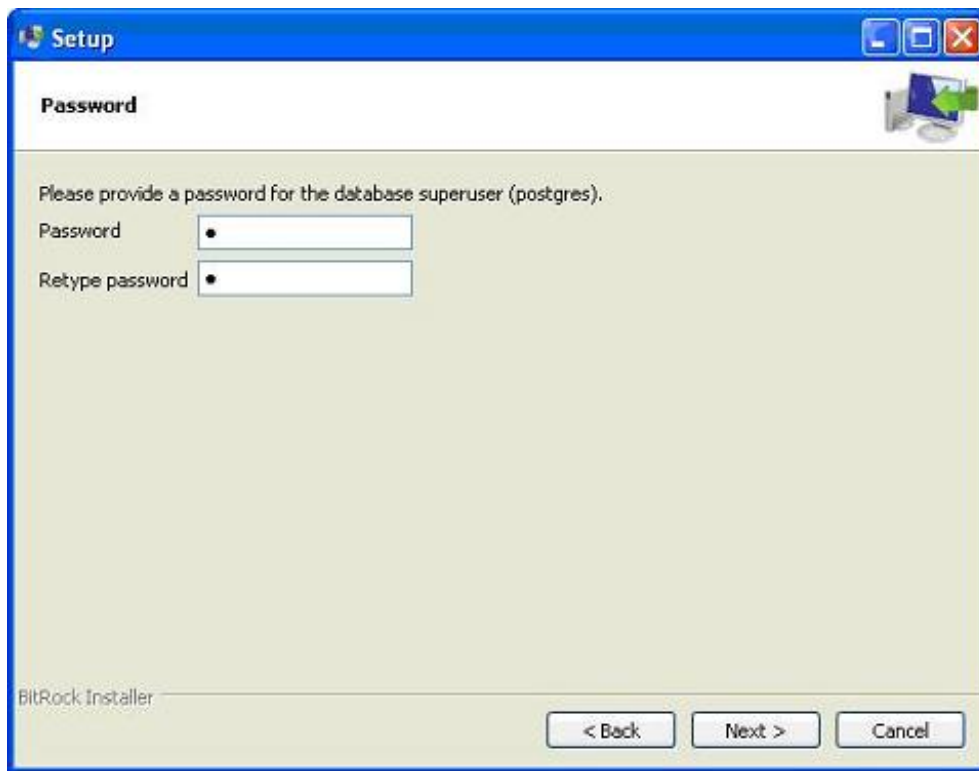
- I download postgresql-9.2.4-1-windows.exe for my Windows PC running in 32 bit mode, so lets run **postgresql-9.2.4-1-windows.exe** as administrator to install PostgreSQL. Select the location where you want to install it. By default it is installed within Program Files folder.



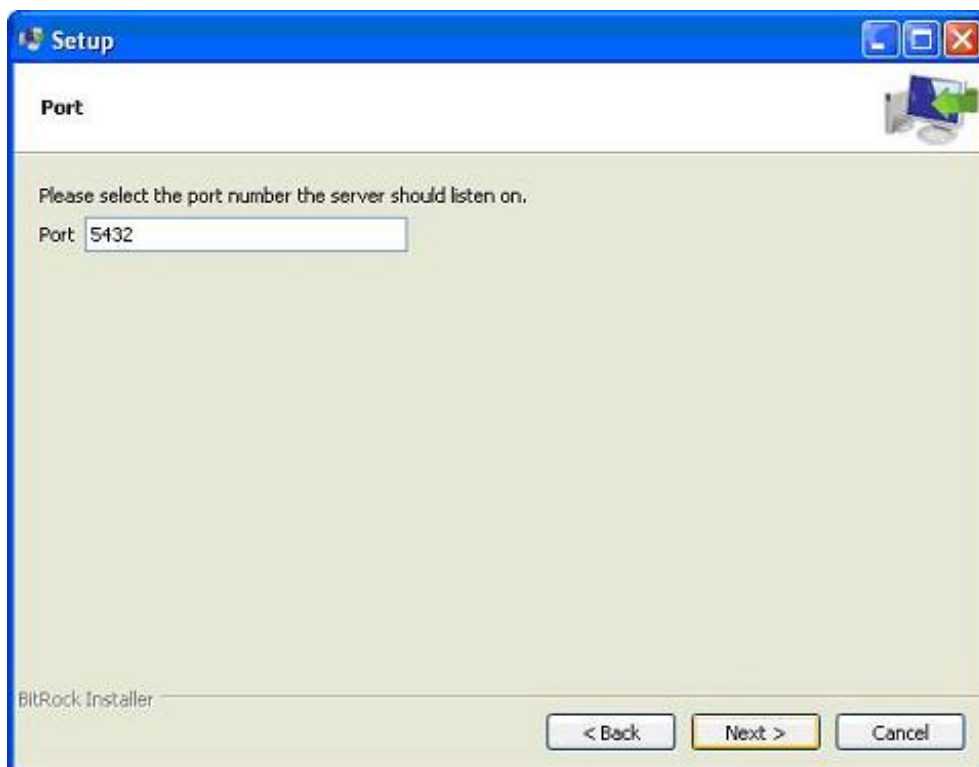
- The next step of the installation process would be to select the directory where data would be stored, by default it is stored under "data" directory



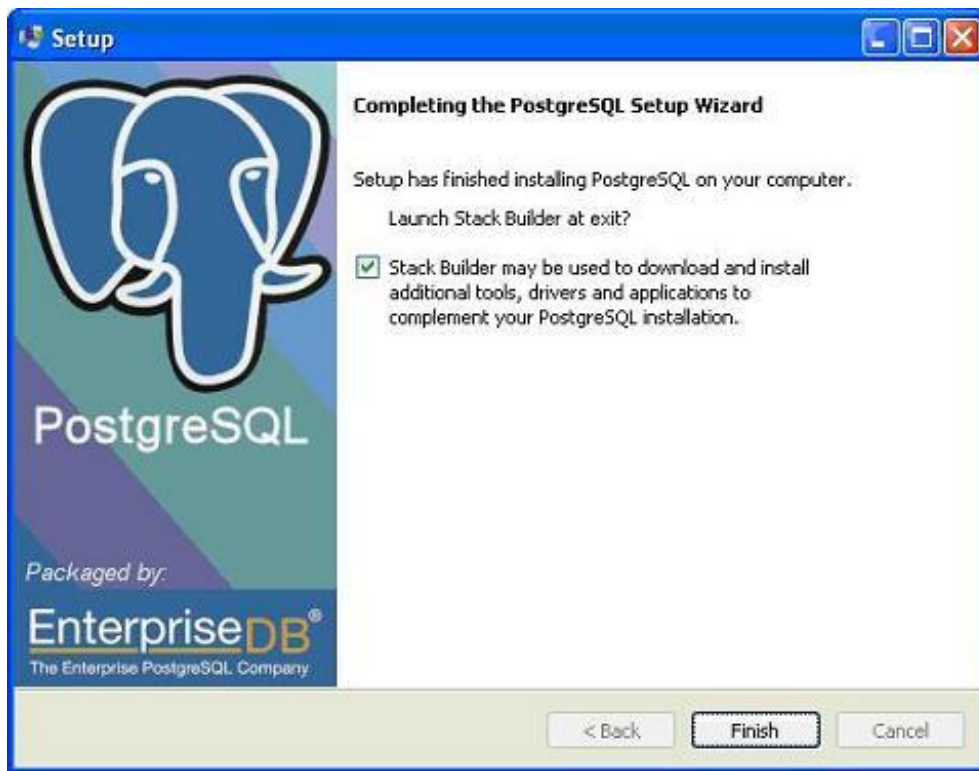
- The next step, setup asks for password, so you can use your favorite password



- The next step, keep the port as default



- The next step, when asked for "Locale", I have selected "English, United States".
- It takes a while to install PostgreSQL on your system. On completion of the installation process, you will get the following screen. Uncheck the checkbox and click on Finish button.



After the installation process is completed, you can access pg Admin III, StackBuilder and PostgreSQL shell from your Program Menu under PostgreSQL 9.2.

Installing PostgreSQL on Mac

Follow the following steps to install PostgreSQL on your Mac machine. Make sure you are logged in as **administrator** before you proceed for the installation.

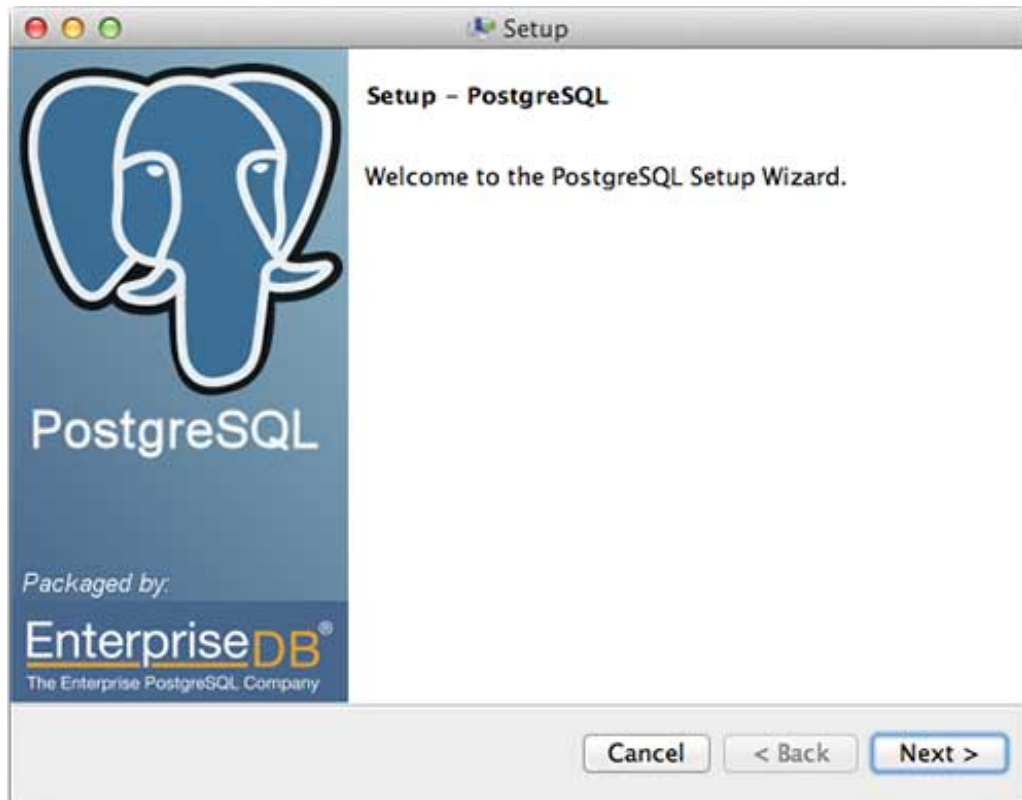
- Pick the latest version number of PostgreSQL for Mac OS available at [EnterpriseDB](https://www.enterprisedb.com)
- I downloaded **postgresql-9.2.4-1-osx.dmg** for my Mac OS running with OS X version 10.8.3. Now, let's open the dmg image in finder and just double click it which will give you PostgreSQL installer in the following window:



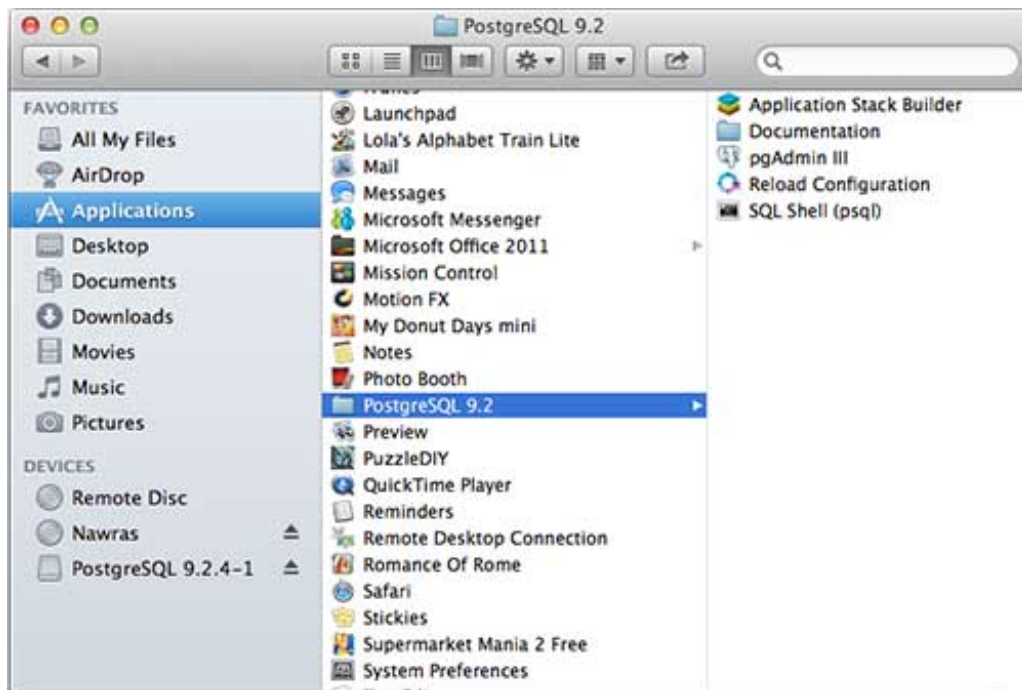
- Next, click on **postgres-9.2.4-1-osx** icon which will give a warning message, just accept the warning and proceed for further installation. It will ask for administrator password using the following window:



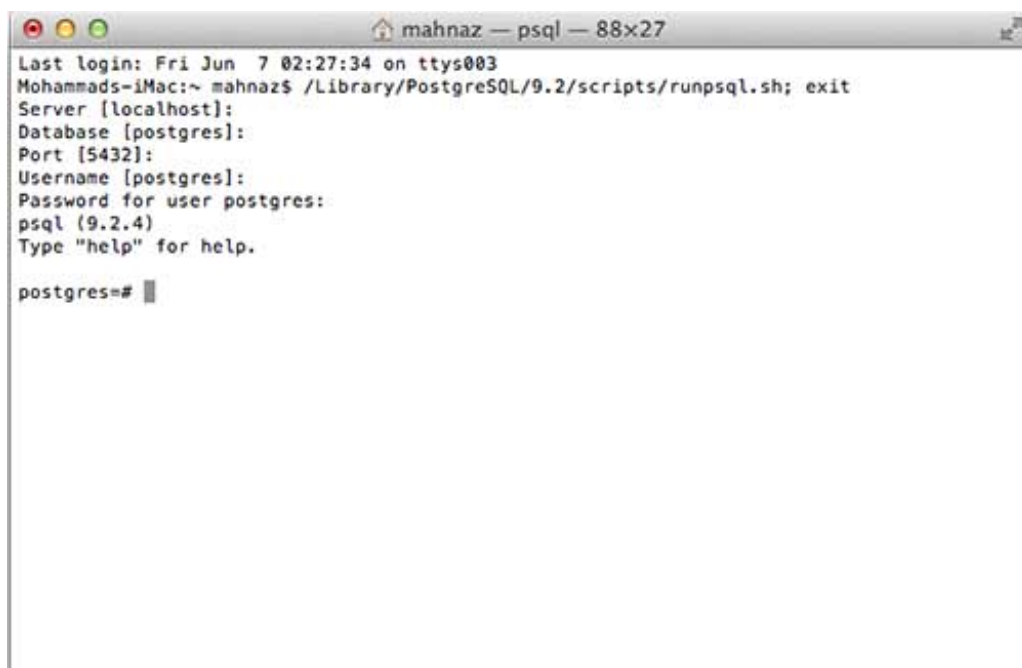
Enter the password and proceed for the installation and after this step, restart your Mac machine, if you do not see following window and after restarting start your installation once again.



- Once you launch the installer, it asks you few basic questions like location of the installation, password of the user who will use database, port number etc. So keep all of them at their default values except password, which you can provide password as per your choice. It will install PostgreSQL at your Mac machine in Application folder which you can check:



- Now, you can launch any of the program to start with. Let's start with SQL Shell. When you launch SQL Shell, just use all the default values it displays except, enter your password which you had selected at the time of installation. If everything goes fine, then you will be inside postgres database and you will be given a **postgres#** prompt as shown below:



POSTGRESQL - SYNTAX

Here is a list of the PostgreSQL SQL commands, followed by the precise syntax rules for each of these commands. This set of commands is taken from the psql command-line tool. Now that you have Postgres installed, open the psql as:

Program Files > PostgreSQL 9.2 > SQL Shell(psql).

Using psql, you can generate the complete list of commands by using the \help command. For the syntax of a specific command, use the following command:

```
postgres-# \help <command_name>
```

The SQL Statement

An SQL statement is comprised of tokens where each token can represent either a keyword, identifier, quoted identifier, constant, or special character symbol. The table below uses a simple SELECT statement to illustrate a basic, but complete, SQL statement and its components.

	SELECT	id, name	FROM	states
Token Type	Keyword	Identifiers	Keyword	Identifier
Description	Command	Id and name columns	Clause	Table name

PostgreSQL SQL commands

ABORT

Abort the current transaction.

```
ABORT [ WORK | TRANSACTION ]
```

ALTER AGGREGATE

Change the definition of an aggregate function.

```
ALTER AGGREGATE name ( type ) RENAME TO new_name  
ALTER AGGREGATE name ( type ) OWNER TO new_owner
```

ALTER CONVERSION

Change the definition of a conversion.

```
ALTER CONVERSION name RENAME TO new_name  
ALTER CONVERSION name OWNER TO new_owner
```

ALTER DATABASE

Change a database specific parameter.

```
ALTER DATABASE name SET parameter { TO | = } { value | DEFAULT }  
ALTER DATABASE name RESET parameter  
ALTER DATABASE name RENAME TO new_name  
ALTER DATABASE name OWNER TO new_owner
```

ALTER DOMAIN

Change the definition of a domain specific parameter.

```
ALTER DOMAIN name { SET DEFAULT expression | DROP DEFAULT }  
ALTER DOMAIN name { SET | DROP } NOT NULL  
ALTER DOMAIN name ADD domain_constraint  
ALTER DOMAIN name DROP CONSTRAINT constraint_name [ RESTRICT | CASCADE ]  
ALTER DOMAIN name OWNER TO new_owner
```

ALTER FUNCTION

Change the definition of a function.

```
ALTER FUNCTION name ( [ type [, ...] ] ) RENAME TO new_name
```



```
ALTER FUNCTION name ( [ type [, ...] ] ) OWNER TO new_owner
```

ALTER GROUP

Change a user group.

```
ALTER GROUP groupname ADD USER username [, ... ]
ALTER GROUP groupname DROP USER username [, ... ]
ALTER GROUP groupname RENAME TO new_name
```

ALTER INDEX

Change the definition of an index.

```
ALTER INDEX name OWNER TO new_owner
ALTER INDEX name SET TABLESPACE indexspace_name
ALTER INDEX name RENAME TO new_name
```

ALTER LANGUAGE

Change the definition of a procedural language.

```
ALTER LANGUAGE name RENAME TO new_name
```

ALTER OPERATOR

Change the definition of an operator.

```
ALTER OPERATOR name ( { lefttype | NONE } , { righttype | NONE } )
OWNER TO new_owner
```

ALTER OPERATOR CLASS

Change the definition of an operator class.

```
ALTER OPERATOR CLASS name USING index_method RENAME TO new_name
ALTER OPERATOR CLASS name USING index_method OWNER TO new_owner
```

ALTER SCHEMA

Change the definition of a schema.

```
ALTER SCHEMA name RENAME TO new_name
ALTER SCHEMA name OWNER TO new_owner
```

ALTER SEQUENCE

Change the definition of a sequence generator.

```
ALTER SEQUENCE name [ INCREMENT [ BY ] increment ]
[ MINVALUE minvalue | NO MINVALUE ]
[ MAXVALUE maxvalue | NO MAXVALUE ]
[ RESTART [ WITH ] start ] [ CACHE cache ] [ [ NO ] CYCLE ]
```

ALTER TABLE

Change the definition of a table.

```
ALTER TABLE [ ONLY ] name [ * ]
action [, ... ]
```

```
ALTER TABLE [ ONLY ] name [ * ]  
RENAME [ COLUMN ] column TO new_column  
ALTER TABLE name  
RENAME TO new_name
```

Where *action* is one of the following lines:

```
ADD [ COLUMN ] column_type [ column_constraint [ ... ] ]  
DROP [ COLUMN ] column [ RESTRICT | CASCADE ]  
ALTER [ COLUMN ] column TYPE type [ USING expression ]  
ALTER [ COLUMN ] column SET DEFAULT expression  
ALTER [ COLUMN ] column DROP DEFAULT  
ALTER [ COLUMN ] column { SET | DROP } NOT NULL  
ALTER [ COLUMN ] column SET STATISTICS integer  
ALTER [ COLUMN ] column SET STORAGE { PLAIN | EXTERNAL | EXTENDED | MAIN }  
ADD table_constraint  
DROP CONSTRAINT constraint_name [ RESTRICT | CASCADE ]  
CLUSTER ON index_name  
SET WITHOUT CLUSTER  
SET WITHOUT OIDS  
OWNER TO new_owner  
SET TABLESPACE tablespace_name
```

ALTER TABLESPACE

Change the definition of a tablespace.

```
ALTER TABLESPACE name RENAME TO new_name  
ALTER TABLESPACE name OWNER TO new_owner
```

ALTER TRIGGER

Change the definition of a trigger.

```
ALTER TRIGGER name ON table RENAME TO new_name
```

ALTER TYPE

Change the definition of a type.

```
ALTER TYPE name OWNER TO new_owner
```

ALTER USER

Change a database user account.

```
ALTER USER name [ [ WITH ] option [ ... ] ]  
ALTER USER name RENAME TO new_name  
ALTER USER name SET parameter { TO | = } { value | DEFAULT }  
ALTER USER name RESET parameter
```

Where *option* can be:

```
[ ENCRYPTED | UNENCRYPTED ] PASSWORD 'password'  
| CREATEDB | NOCREATEDB  
| CREATEUSER | NOCREATEUSER  
| VALID UNTIL 'abstime'
```

ANALYZE

Collect statistics about a database.

```
ANALYZE [ VERBOSE ] [ table [ (column [, ...] ) ] ]
```

BEGIN

Start a transaction block.

```
BEGIN [ WORK | TRANSACTION ] [ transaction_mode [, ...] ]
```

Where *transaction_mode* is one of:

```
ISOLATION LEVEL { SERIALIZABLE | REPEATABLE READ | READ COMMITTED  
| READ UNCOMMITTED }  
READ WRITE | READ ONLY
```

CHECKPOINT

Force a transaction log checkpoint.

```
CHECKPOINT
```

CLOSE

Close a cursor.

```
CLOSE name
```

CLUSTER

Cluster a table according to an index.

```
CLUSTER index_name ON table_name  
CLUSTER table_name  
CLUSTER
```

COMMENT

Define or change the comment of an object.

```
COMMENT ON  
{  
TABLE object_name |  
COLUMN table_name.column_name |  
AGGREGATE agg_name (agg_type) |  
CAST (source_type AS target_type) |  
CONSTRAINT constraint_name ON table_name |  
CONVERSION object_name |  
DATABASE object_name |  
DOMAIN object_name |  
FUNCTION func_name (arg1_type, arg2_type, ...) |  
INDEX object_name |  
LARGE OBJECT large_object_oid |  
OPERATOR op (left_operand_type, right_operand_type) |  
OPERATOR CLASS object_name USING index_method |  
[ PROCEDURAL ] LANGUAGE object_name |  
RULE rule_name ON table_name |  
SCHEMA object_name |  
SEQUENCE object_name |  
TRIGGER trigger_name ON table_name |  
TYPE object_name |  
VIEW object_name  
} IS 'text'
```

COMMIT

Commit the current transaction.

```
COMMIT [ WORK | TRANSACTION ]
```

COPY

Copy data between a file and a table.

```
COPY table_name [ ( column [, ...] ) ]  
FROM { 'filename' | STDIN }  
[ [ WITH ]  
[ BINARY ]  
[ OIDS ]  
[ DELIMITER [ AS ] 'delimiter' ]  
[ NULL [ AS ] 'null string' ]  
[ CSV [ QUOTE [ AS ] 'quote' ]  
[ ESCAPE [ AS ] 'escape' ]  
[ FORCE NOT NULL column [, ...] ]  
COPY table_name [ ( column [, ...] ) ]  
TO { 'filename' | STDOUT }  
[ [ WITH ]  
[ BINARY ]  
[ OIDS ]  
[ DELIMITER [ AS ] 'delimiter' ]  
[ NULL [ AS ] 'null string' ]  
[ CSV [ QUOTE [ AS ] 'quote' ]  
[ ESCAPE [ AS ] 'escape' ]  
[ FORCE QUOTE column [, ...] ]
```

CREATE AGGREGATE

Define a new aggregate function.

```
CREATE AGGREGATE name (  
  BASETYPE = input_data_type,  
  SFUNC = sfunc,  
  STYPE = state_data_type  
  [ , FINALFUNC = ffunc ]  
  [ , INITCOND = initial_condition ]  
)
```

CREATE CAST

Define a new cast.

```
CREATE CAST (source_type AS target_type)  
WITH FUNCTION func_name (arg_types)  
[ AS ASSIGNMENT | AS IMPLICIT ]  
CREATE CAST (source_type AS target_type)  
WITHOUT FUNCTION  
[ AS ASSIGNMENT | AS IMPLICIT ]
```

CREATE CONSTRAINT TRIGGER

Define a new constraint trigger.

```
CREATE CONSTRAINT TRIGGER name  
AFTER events ON  
table_name constraint attributes  
FOR EACH ROW EXECUTE PROCEDURE func_name ( args )
```

CREATE CONVERSION

Define a new conversion.

```
CREATE [DEFAULT] CONVERSION name
FOR source_encoding TO dest_encoding FROM func_name
```

CREATE DATABASE

Create a new database.

```
CREATE DATABASE name
[ [ WITH ] [ OWNER [=] db_owner ]
[ TEMPLATE [=] template ]
[ ENCODING [=] encoding ]
[ TABLESPACE [=] tablespace ] ]
```

CREATE DOMAIN

Define a new domain.

```
CREATE DOMAIN name [AS] data_type
[ DEFAULT expression ]
[ constraint [ ... ] ]
```

Where *constraint* is:

```
[ CONSTRAINT constraint_name ]
{ NOT NULL | NULL | CHECK (expression) }
```

CREATE FUNCTION

Define a new function.

```
CREATE [ OR REPLACE ] FUNCTION name ( [ [ arg_name ] arg_type [, ...] ] )
RETURNS ret_type
{ LANGUAGE lang_name
| IMMUTABLE | STABLE | VOLATILE
| CALLED ON NULL INPUT | RETURNS NULL ON NULL INPUT | STRICT
| [ EXTERNAL ] SECURITY INVOKER | [ EXTERNAL ] SECURITY DEFINER
| AS 'definition'
| AS 'obj_file', 'link_symbol'
} ...
[ WITH ( attribute [, ...] ) ]
```

CREATE GROUP

Define a new user group.

```
CREATE GROUP name [ [ WITH ] option [ ... ] ]
Where option can be:
SYSID gid
| USER username [, ...]
```

CREATE INDEX

Define a new index.

```
CREATE [ UNIQUE ] INDEX name ON table [ USING method ]
( { column | ( expression ) } [ opclass ] [, ...] )
[ TABLESPACE tablespace ]
[ WHERE predicate ]
```

CREATE LANGUAGE

Define a new procedural language.

```
CREATE [ TRUSTED ] [ PROCEDURAL ] LANGUAGE name
HANDLER call_handler [ VALIDATOR val_function ]
```

CREATE OPERATOR

Define a new operator.

```
CREATE OPERATOR name (
PROCEDURE = func_name
[, LEFTARG = left_type ] [, RIGHTARG = right_type ]
[, COMMUTATOR = com_op ] [, NEGATOR = neg_op ]
[, RESTRICT = res_proc ] [, JOIN = join_proc ]
[, HASHES ] [, MERGES ]
[, SORT1 = left_sort_op ] [, SORT2 = right_sort_op ]
[, LTCMP = less_than_op ] [, GTCMP = greater_than_op ]
)
```

CREATE OPERATOR CLASS

Define a new operator class.

```
CREATE OPERATOR CLASS name [ DEFAULT ] FOR TYPE data_type
USING index_method AS
{ OPERATOR strategy_number operator_name [ ( op_type, op_type ) ] [ RECHECK ]
| FUNCTION support_number func_name ( argument_type [, ...] )
| STORAGE storage_type
} [, ... ]
```

CREATE RULE

Define a new rewrite rule.

```
CREATE [ OR REPLACE ] RULE name AS ON event
TO table [ WHERE condition ]
DO [ ALSO | INSTEAD ] { NOTHING | command | ( command ; command ... ) }
```

CREATE SCHEMA

Define a new schema.

```
CREATE SCHEMA schema_name
[ AUTHORIZATION username ] [ schema_element [ ... ] ]
CREATE SCHEMA AUTHORIZATION username
[ schema_element [ ... ] ]
```

CREATE SEQUENCE

Define a new sequence generator.

```
CREATE [ TEMPORARY | TEMP ] SEQUENCE name
[ INCREMENT [ BY ] increment ]
[ MINVALUE minvalue | NO MINVALUE ]
[ MAXVALUE maxvalue | NO MAXVALUE ]
[ START [ WITH ] start ] [ CACHE cache ] [ [ NO ] CYCLE ]
```

CREATE TABLE

Define a new table.

```
CREATE [ [ GLOBAL | LOCAL ] { TEMPORARY | TEMP } ] TABLE table_name (
{ column_name data_type [ DEFAULT default_expr ] [ column_constraint [ ... ] ]
| table_constraint
| LIKE parent_table [ { INCLUDING | EXCLUDING } DEFAULTS ] } [, ... ]
)
[ INHERITS ( parent_table [, ... ] ) ]
[ WITH OIDS | WITHOUT OIDS ]
[ ON COMMIT { PRESERVE ROWS | DELETE ROWS | DROP } ]
[ TABLESPACE tablespace ]
```

Where *column_constraint* is:

```
[ CONSTRAINT constraint_name ]
{ NOT NULL |
NULL |
UNIQUE [ USING INDEX TABLESPACE tablespace ] |
PRIMARY KEY [ USING INDEX TABLESPACE tablespace ] |
CHECK (expression) |
REFERENCES ref_table [ ( ref_column ) ]
[ MATCH FULL | MATCH PARTIAL | MATCH SIMPLE ]
[ ON DELETE action ] [ ON UPDATE action ] }
[ DEFERRABLE | NOT DEFERRABLE ] [ INITIALLY DEFERRED | INITIALLY IMMEDIATE ]
```

And *table_constraint* is:

```
[ CONSTRAINT constraint_name ]
{ UNIQUE ( column_name [, ... ] ) [ USING INDEX TABLESPACE tablespace ] |
PRIMARY KEY ( column_name [, ... ] ) [ USING INDEX TABLESPACE tablespace ] |
CHECK ( expression ) |
FOREIGN KEY ( column_name [, ... ] )
REFERENCES ref_table [ ( ref_column [, ... ] ) ]
[ MATCH FULL | MATCH PARTIAL | MATCH SIMPLE ]
[ ON DELETE action ] [ ON UPDATE action ] }
[ DEFERRABLE | NOT DEFERRABLE ] [ INITIALLY DEFERRED | INITIALLY IMMEDIATE ]
```

CREATE TABLE AS

Define a new table from the results of a query.

```
CREATE [ [ GLOBAL | LOCAL ] { TEMPORARY | TEMP } ] TABLE table_name
[ (column_name [, ... ] ) ] [ [ WITH | WITHOUT ] OIDS ]
AS query
```

CREATE TABLESPACE

Define a new tablespace.

```
CREATE TABLESPACE tablespace_name [ OWNER username ] LOCATION 'directory'
```

CREATE TRIGGER

Define a new trigger.

```
CREATE TRIGGER name { BEFORE | AFTER } { event [ OR ... ] }
ON table [ FOR [ EACH ] { ROW | STATEMENT } ]
EXECUTE PROCEDURE func_name ( arguments )
```

CREATE TYPE

Define a new data type.

```
CREATE TYPE name AS
( attribute_name data_type [, ... ] )
CREATE TYPE name (
```

```

INPUT = input_function,
OUTPUT = output_function
[ , RECEIVE = receive_function ]
[ , SEND = send_function ]
[ , ANALYZE = analyze_function ]
[ , INTERNALLENGTH = { internal_length | VARIABLE } ]
[ , PASSEDBYVALUE ]
[ , ALIGNMENT = alignment ]
[ , STORAGE = storage ]
[ , DEFAULT = default ]
[ , ELEMENT = element ]
[ , DELIMITER = delimiter ]
)

```

CREATE USER

Define a new database user account.

```
CREATE USER name [ [ WITH ] option [ ... ] ]
```

Where *option* can be:

```

SYSID uid
| [ ENCRYPTED | UNENCRYPTED ] PASSWORD 'password'
| CREATEDB | NOCREATEDB
| CREATEUSER | NOCREATEUSER
| IN GROUP group_name [, ...]
| VALID UNTIL 'abs_time'

```

CREATE VIEW

Define a new view.

```
CREATE [ OR REPLACE ] VIEW name [ ( column_name [, ...] ) ] AS query
```

DEALLOCATE

Deallocate a prepared statement.

```
DEALLOCATE [ PREPARE ] plan_name
```

DECLARE

Define a cursor.

```

DECLARE name [ BINARY ] [ INSENSITIVE ] [ [ NO ] SCROLL ]
CURSOR [ { WITH | WITHOUT } HOLD ] FOR query
[ FOR { READ ONLY | UPDATE [ OF column [, ...] ] } ]

```

DELETE

Delete rows of a table.

```
DELETE FROM [ ONLY ] table [ WHERE condition ]
```

DROP AGGREGATE

Remove an aggregate function.

```
DROP AGGREGATE name ( type ) [ CASCADE | RESTRICT ]
```


DROP CAST

Remove a cast.

```
DROP CAST (source_type AS target_type) [ CASCADE | RESTRICT ]
```

DROP CONVERSION

Remove a conversion.

```
DROP CONVERSION name [ CASCADE | RESTRICT ]
```

DROP DATABASE

Remove a database.

```
DROP DATABASE name
```

DROP DOMAIN

Remove a domain.

```
DROP DOMAIN name [, ...] [ CASCADE | RESTRICT ]
```

DROP FUNCTION

Remove a function.

```
DROP FUNCTION name ( [ type [, ...] ] ) [ CASCADE | RESTRICT ]
```

DROP GROUP

Remove a user group.

```
DROP GROUP name
```

DROP INDEX

Remove an index.

```
DROP INDEX name [, ...] [ CASCADE | RESTRICT ]
```

DROP LANGUAGE

Remove a procedural language.

```
DROP [ PROCEDURAL ] LANGUAGE name [ CASCADE | RESTRICT ]
```

DROP OPERATOR

Remove an operator.

```
DROP OPERATOR name ( { left_type | NONE } , { right_type | NONE } )  
[ CASCADE | RESTRICT ]
```

DROP OPERATOR CLASS

Remove an operator class.

```
DROP OPERATOR CLASS name USING index_method [ CASCADE | RESTRICT ]
```

DROP RULE

Remove a rewrite rule.

```
DROP RULE name ON relation [ CASCADE | RESTRICT ]
```

DROP SCHEMA

Remove a schema.

```
DROP SCHEMA name [, ...] [ CASCADE | RESTRICT ]
```

DROP SEQUENCE

Remove a sequence.

```
DROP SEQUENCE name [, ...] [ CASCADE | RESTRICT ]
```

DROP TABLE

Remove a table.

```
DROP TABLE name [, ...] [ CASCADE | RESTRICT ]
```

DROP TABLESPACE

Remove a tablespace.

```
DROP TABLESPACE tablespace_name
```

DROP TRIGGER

Remove a trigger.

```
DROP TRIGGER name ON table [ CASCADE | RESTRICT ]
```

DROP TYPE

Remove a data type.

```
DROP TYPE name [, ...] [ CASCADE | RESTRICT ]
```

DROP USER

Remove a database user account.

```
DROP USER name
```

DROP VIEW

Remove a view.

```
DROP VIEW name [, ...] [ CASCADE | RESTRICT ]
```

END

Commit the current transaction.

```
END [ WORK | TRANSACTION ]
```

EXECUTE

Execute a prepared statement.

```
EXECUTE plan_name [ (parameter [, ...] ) ]
```

EXPLAIN

Show the execution plan of a statement.

```
EXPLAIN [ ANALYZE ] [ VERBOSE ] statement
```

FETCH

Retrieve rows from a query using a cursor.

```
FETCH [ direction { FROM | IN } ] cursor_name
```

Where *direction* can be empty or one of:

```
NEXT  
PRIOR  
FIRST  
LAST  
ABSOLUTE count  
RELATIVE count  
count  
ALL  
FORWARD  
FORWARD count  
FORWARD ALL  
BACKWARD  
BACKWARD count  
BACKWARD ALL
```

GRANT

Define access privileges.

```
GRANT { { SELECT | INSERT | UPDATE | DELETE | RULE | REFERENCES | TRIGGER }  
[,...] | ALL [ PRIVILEGES ] }  
ON [ TABLE ] table_name [, ...]  
TO { username | GROUP group_name | PUBLIC } [, ...] [ WITH GRANT OPTION ]  
  
GRANT { { CREATE | TEMPORARY | TEMP } [,...] | ALL [ PRIVILEGES ] }  
ON DATABASE db_name [, ...]  
TO { username | GROUP group_name | PUBLIC } [, ...] [ WITH GRANT OPTION ]  
  
GRANT { CREATE | ALL [ PRIVILEGES ] }  
ON TABLESPACE tablespace_name [, ...]  
TO { username | GROUP group_name | PUBLIC } [, ...] [ WITH GRANT OPTION ]  
  
GRANT { EXECUTE | ALL [ PRIVILEGES ] }  
ON FUNCTION func_name ([type, ...]) [, ...]  
TO { username | GROUP group_name | PUBLIC } [, ...] [ WITH GRANT OPTION ]  
  
GRANT { USAGE | ALL [ PRIVILEGES ] }
```

```
ON LANGUAGE lang_name [, ...]
TO { username | GROUP group_name | PUBLIC } [, ...] [ WITH GRANT OPTION ]

GRANT { { CREATE | USAGE } [, ...] | ALL [ PRIVILEGES ] }
ON SCHEMA schema_name [, ...]
TO { username | GROUP group_name | PUBLIC } [, ...] [ WITH GRANT OPTION ]
```

INSERT

Create new rows in a table.

```
INSERT INTO table [ ( column [, ...] ) ]
{ DEFAULT VALUES | VALUES ( { expression | DEFAULT } [, ...] ) | query }
```

LISTEN

Listen for a notification.

```
LISTEN name
```

LOAD

Load or reload a shared library file.

```
LOAD 'filename'
```

LOCK

Lock a table.

```
LOCK [ TABLE ] name [, ...] [ IN lock_mode MODE ] [ NOWAIT ]
```

Where *lock_mode* is one of:

```
ACCESS SHARE | ROW SHARE | ROW EXCLUSIVE | SHARE UPDATE EXCLUSIVE
| SHARE | SHARE ROW EXCLUSIVE | EXCLUSIVE | ACCESS EXCLUSIVE
```

MOVE

Position a cursor.

```
MOVE [ direction { FROM | IN } ] cursor_name
```

NOTIFY

Generate a notification.

```
NOTIFY name
```

PREPARE

Prepare a statement for execution.

```
PREPARE plan_name [ (data_type [, ...] ) ] AS statement
```

REINDEX

Rebuild indexes.

```
REINDEX { DATABASE | TABLE | INDEX } name [ FORCE ]
```

RELEASE SAVEPOINT

Destroy a previously defined savepoint.

```
RELEASE [ SAVEPOINT ] savepoint_name
```

RESET

Restore the value of a runtime parameter to the default value.

```
RESET name  
RESET ALL
```

REVOKE

Remove access privileges.

```
REVOKE [ GRANT OPTION FOR ]  
{ { SELECT | INSERT | UPDATE | DELETE | RULE | REFERENCES | TRIGGER }  
[,...] | ALL [ PRIVILEGES ] }  
ON [ TABLE ] table_name [, ...]  
FROM { username | GROUP group_name | PUBLIC } [, ...]  
[ CASCADE | RESTRICT ]
```

```
REVOKE [ GRANT OPTION FOR ]  
{ { CREATE | TEMPORARY | TEMP } [,...] | ALL [ PRIVILEGES ] }  
ON DATABASE db_name [, ...]  
FROM { username | GROUP group_name | PUBLIC } [, ...]  
[ CASCADE | RESTRICT ]
```

```
REVOKE [ GRANT OPTION FOR ]  
{ CREATE | ALL [ PRIVILEGES ] }  
ON TABLESPACE tablespace_name [, ...]  
FROM { username | GROUP group_name | PUBLIC } [, ...]  
[ CASCADE | RESTRICT ]
```

```
REVOKE [ GRANT OPTION FOR ]  
{ EXECUTE | ALL [ PRIVILEGES ] }  
ON FUNCTION func_name ([type, ...]) [, ...]  
FROM { username | GROUP group_name | PUBLIC } [, ...]  
[ CASCADE | RESTRICT ]
```

```
REVOKE [ GRANT OPTION FOR ]  
{ USAGE | ALL [ PRIVILEGES ] }  
ON LANGUAGE lang_name [, ...]  
FROM { username | GROUP group_name | PUBLIC } [, ...]  
[ CASCADE | RESTRICT ]
```

```
REVOKE [ GRANT OPTION FOR ]  
{ { CREATE | USAGE } [,...] | ALL [ PRIVILEGES ] }  
ON SCHEMA schema_name [, ...]  
FROM { username | GROUP group_name | PUBLIC } [, ...]  
[ CASCADE | RESTRICT ]
```

ROLLBACK

Abort the current transaction.

```
ROLLBACK [ WORK | TRANSACTION ]
```

ROLLBACK TO SAVEPOINT

Roll back to a savepoint.

```
ROLLBACK [ WORK | TRANSACTION ] TO [ SAVEPOINT ] savepoint_name
```

SAVEPOINT

Define a new savepoint within the current transaction.

```
SAVEPOINT savepoint_name
```

SELECT

Retrieve rows from a table or view.

```
SELECT [ ALL | DISTINCT [ ON ( expression [, ...] ) ] ]  
* | expression [ AS output_name ] [, ...]  
[ FROM from_item [, ...] ]  
[ WHERE condition ]  
[ GROUP BY expression [, ...] ]  
[ HAVING condition [, ...] ]  
[ { UNION | INTERSECT | EXCEPT } [ ALL ] select ]  
[ ORDER BY expression [ ASC | DESC | USING operator ] [, ...] ]  
[ LIMIT { count | ALL } ]  
[ OFFSET start ]  
[ FOR UPDATE [ OF table_name [, ...] ] ]
```

Where *from_item* can be one of:

```
[ ONLY ] table_name [ * ] [ [ AS ] alias [ ( column_alias [, ...] ) ] ]  
( select ) [ AS ] alias [ ( column_alias [, ...] ) ]  
function_name ( [ argument [, ...] ] )  
[ AS ] alias [ ( column_alias [, ...] | column_definition [, ...] ) ]  
function_name ( [ argument [, ...] ] ) AS ( column_definition [, ...] )  
from_item [ NATURAL ] join_type from_item  
[ ON join_condition | USING ( join_column [, ...] ) ]
```

SELECT INTO

Define a new table from the results of a query.

```
SELECT [ ALL | DISTINCT [ ON ( expression [, ...] ) ] ]  
* | expression [ AS output_name ] [, ...]  
INTO [ TEMPORARY | TEMP ] [ TABLE ] new_table  
[ FROM from_item [, ...] ]  
[ WHERE condition ]  
[ GROUP BY expression [, ...] ]  
[ HAVING condition [, ...] ]  
[ { UNION | INTERSECT | EXCEPT } [ ALL ] select ]  
[ ORDER BY expression [ ASC | DESC | USING operator ] [, ...] ]  
[ LIMIT { count | ALL } ]  
[ OFFSET start ]  
[ FOR UPDATE [ OF table_name [, ...] ] ]
```

SET

Change a runtime parameter.

```
SET [ SESSION | LOCAL ] name { TO | = } { value | 'value' | DEFAULT }  
SET [ SESSION | LOCAL ] TIME ZONE { time_zone | LOCAL | DEFAULT }
```

SET CONSTRAINTS

Set constraint checking modes for the current transaction.

```
SET CONSTRAINTS { ALL | name [, ...] } { DEFERRED | IMMEDIATE }
```

SET SESSION AUTHORIZATION

Set the session user identifier and the current user identifier of the current session.

```
SET [ SESSION | LOCAL ] SESSION AUTHORIZATION username
SET [ SESSION | LOCAL ] SESSION AUTHORIZATION DEFAULT
RESET SESSION AUTHORIZATION
```

SET TRANSACTION

Set the characteristics of the current transaction.

```
SET TRANSACTION transaction_mode [, ...]
SET SESSION CHARACTERISTICS AS TRANSACTION transaction_mode [, ...]
```

Where *transaction_mode* is one of:

```
ISOLATION LEVEL { SERIALIZABLE | REPEATABLE READ | READ COMMITTED
| READ UNCOMMITTED }
READ WRITE | READ ONLY
```

SHOW

Show the value of a runtime parameter.

```
SHOW name
SHOW ALL
```

START TRANSACTION

Start a transaction block.

```
START TRANSACTION [ transaction_mode [, ...] ]
```

Where *transaction_mode* is one of:

```
ISOLATION LEVEL { SERIALIZABLE | REPEATABLE READ | READ COMMITTED
| READ UNCOMMITTED }
READ WRITE | READ ONLY
```

TRUNCATE

Empty a table.

```
TRUNCATE [ TABLE ] name
```

UNLISTEN

Stop listening for a notification.

```
UNLISTEN { name | * }
```

UPDATE

Update rows of a table.

```
UPDATE [ ONLY ] table SET column = { expression | DEFAULT } [, ...]
[ FROM from_list ]
[ WHERE condition ]
```

VACUUM

Garbage-collect and optionally analyze a database.

```
VACUUM [ FULL ] [ FREEZE ] [ VERBOSE ] [ table ]
VACUUM [ FULL ] [ FREEZE ] [ VERBOSE ] ANALYZE [ table [ (column [, ...] ) ] ]
```

POSTGRESQL - DATA TYPE

While creating table, for each column, you specify a data type, i.e., what kind of data you want to store in the table fields.

This enables several benefits:

- **Consistency:** Operations against columns of same data type give consistent results, and are usually the fastest.
- **Validation:** Proper use of data types implies format validation of data and rejection of data outside the scope of data type.
- **Compactness:** As a column can store a single type of value, it is stored in a compact way.
- **Performance:** Proper use of data types gives the most efficient storage of data. The values stored can be processed quickly, which enhances the performance.

PostgreSQL supports a wide set of Data Types. Besides, users can create their own custom data type using *CREATE TYPE* SQL command. There are different categories of data types in PostgreSQL. They are discussed as below:

Numeric Types

Numeric types consist of two-byte, four-byte, and eight-byte integers, four-byte and eight-byte floating-point numbers, and selectable-precision decimals. Table below lists the available types.

Name	Storage Size	Description	Range
smallint	2 bytes	small-range integer	-32768 to +32767
integer	4 bytes	typical choice for integer	-2147483648 to +2147483647
bigint	8 bytes	large-range integer	-9223372036854775808 to 9223372036854775807
decimal	variable	user-specified precision,exact	up to 131072 digits before the decimal point; up to 16383 digits after the decimal point
numeric	variable	user-specified precision,exact	up to 131072 digits before the decimal point; up to 16383 digits after the decimal point
real	4 bytes	variable-precision,inexact	6 decimal digits precision
double precision	8 bytes	variable-precision,inexact	15 decimal digits precision
smallserial	2 bytes	small autoincrementing integer	1 to 32767
serial	4 bytes	autoincrementing integer	1 to 2147483647
bigserial	8 bytes	large autoincrementing integer	1 to 9223372036854775807

Monetary Types

The *money* type stores a currency amount with a fixed fractional precision. Values of the *numeric*, *int*, and *bigint* data types can be cast to *money*. Using Floating point numbers is not recommended to handle money due to the potential for rounding errors.

Name	Storage Size	Description	Range
money	8 bytes	currency amount	-92233720368547758.08 to +92233720368547758.07

Character Types

The table below lists general-purpose character types available in PostgreSQL.

Name	Description
character varying (n), varchar(n)	variable-length with limit
character(n), char(n)	fixed-length, blank padded
text	variable unlimited length

Binary Data Types

The *bytea* data type allows storage of binary strings as in the table below.

Name	Storage Size	Description
bytea	1 or 4 bytes plus the actual binary string	variable-length binary string

Date/Time Types

PostgreSQL supports the full set of SQL date and time types, as shown in table below. Dates are counted according to the Gregorian calendar. Here, all the types have resolution of **1 microsecond / 14 digits** except **date** type, whose resolution is **day**.

Name	Storage Size	Description	Low Value	High Value
timestamp [(p)] [without time zone]	8 bytes	both date and time (no time zone)	4713 BC	294276 AD
timestamp [(p)] with time zone	8 bytes	both date and time, with time zone	4713 BC	294276 AD
date	4 bytes	date (no time of day)	4713 BC	5874897 AD
time [(p)] [without time zone]	8 bytes	time of day (no date)	00:00:00	24:00:00
time [(p)] with time zone	12 bytes	times of day only, with time zone	00:00:00+1459	24:00:00-1459

interval [fields] [(p)]	12 bytes	time interval	-1780000000 years	1780000000 years
---------------------------	----------	---------------	----------------------	---------------------

Boolean Type

PostgreSQL provides the standard SQL type boolean. The boolean type can have several states: *true*, *false*, and a third state, *unknown*, which is represented by the SQL null value.

Name	Storage Size	Description
boolean	1 byte	state of true or false

Enumerated Type

Enumerated (enum) types are data types that comprise a static, ordered set of values. They are equivalent to the enum types supported in a number of programming languages.

Unlike other types, Enumerated Types need to be created using CREATE TYPE command. This type is used to store a static, ordered set of values; for example, compass directions, i.e., NORTH, SOUTH, EAST, and WEST or days of the week as below:

```
CREATE TYPE week AS ENUM ('Mon', 'Tue', 'Wed', 'Thu', 'Fri', 'Sat', 'Sun');
```

Enumerated once created, they can be used like any other types.

Geometric Type

Geometric data types represent two-dimensional spatial objects. The most fundamental type, the point, forms the basis for all of the other types.

Name	Storage Size	Representation	Description
point	16 bytes	Point on a plane	(x,y)
line	32 bytes	Infinite line (not fully implemented)	((x1,y1),(x2,y2))
lseg	32 bytes	Finite line segment	((x1,y1),(x2,y2))
box	32 bytes	Rectangular box	((x1,y1),(x2,y2))
path	16+16n bytes	Closed path (similar to polygon)	((x1,y1),...)
path	16+16n bytes	Open path	[(x1,y1),...]
polygon	40+16n	Polygon (similar to closed path)	((x1,y1),...)
circle	24 bytes	Circle	<(x,y),r> (center point and radius)

Network Address Type

PostgreSQL offers data types to store IPv4, IPv6, and MAC addresses. It is better to use these types instead of plain text types to store network addresses, because these types offer input error checking and specialized operators and functions.

Name	Storage Size	Description
------	--------------	-------------

cidr	7 or 19 bytes	IPv4 and IPv6 networks
inet	7 or 19 bytes	IPv4 and IPv6 hosts and networks
macaddr	6 bytes	MAC addresses

Bit String Type

Bit String Types are used to store bit masks. They are either 0 or 1. There are two SQL bit types: **bit(n)** and **bit varying (n)**, where n is a positive integer.

Text Search Type

This type supports full text search, which is the activity of searching through a collection of natural-language documents to locate those that best match a query. There are two Data Types for this :

Name	Description
tsvector	This is a sorted list of distinct words that have been normalized to merge different variants of the same word, called as "lexemes".
tsquery	This stores lexemes that are to be searched for, and combines them honoring the Boolean operators & (AND), (OR), and ! (NOT). Parentheses can be used to enforce grouping of the operators.

UUID Type

A UUID (Universally Unique Identifiers) is written as a sequence of lower-case hexadecimal digits, in several groups separated by hyphens, specifically a group of 8 digits followed by three groups of 4 digits followed by a group of 12 digits, for a total of 32 digits representing the 128 bits.

An example of a UUID is: **550e8400-e29b-41d4-a716-446655440000**

XML Type

The xml data type can be used to store XML data. For storing XML data, first you create XML values using function `xmlparse` as follows:

```
XMLPARSE (DOCUMENT '<?xml version="1.0"?>
<tutorial>
<title>PostgreSQL Tutorial </title>
  <topics>...</topics>
</tutorial>')

XMLPARSE (CONTENT 'xyz<foo>bar</foo><bar>foo</bar>')
```

JSON Type

The *json* data type can be used to store JSON (JavaScript Object Notation) data. Such data can also be stored as *text*, but the *json* data type has the advantage of checking that each stored value is a valid JSON value. There are also related support functions available which can be used directly to handle JSON data type as follows:

Example	Example Result
<code>array_to_json('{{1,5},{99,100}}'::int[])</code>	<code>[[1,5],[99,100]]</code>
<code>row_to_json(row(1,'foo'))</code>	<code>{"f1":1,"f2":"foo"}</code>

Array Type

PostgreSQL gives opportunity to define a column of a table as a variable length multidimensional array. Arrays of any built-in or user-defined base type, enum type, or composite type can be created.

Declaration of Arrays

Array type can be declared as :

```
CREATE TABLE monthly_savings (  
    name text,  
    saving_per_quarter integer[],  
    scheme text[][]  
);
```

or by using keyword "ARRAY" as:

```
CREATE TABLE monthly_savings (  
    name text,  
    saving_per_quarter integer ARRAY[4],  
    scheme text[][]  
);
```

Inserting values

Array values can be inserted as a literal constant, enclosing the element values within curly braces and separating them by commas. An example is as below:

```
INSERT INTO monthly_savings  
VALUES ('Manisha',  
'{20000, 14600, 23500, 13250}',  
'{"FD", "MF"}, {"FD", "Property"}');
```

Accessing Arrays

An example for accessing Arrays is shown below. The command below will select persons whose savings are more in second quarter than fourth quarter.

```
SELECT name FROM monthly_savings WHERE saving_per_quarter[2] > saving_per_quarter[4];
```

Modifying Arrays

An example of modifying arrays is as shown below.

```
UPDATE monthly_savings SET saving_per_quarter = '{25000,25000,27000,27000}'  
WHERE name = 'Manisha';
```

or using the ARRAY expression syntax:

```
UPDATE monthly_savings SET saving_per_quarter = ARRAY[25000,25000,27000,27000]  
WHERE name = 'Manisha';
```

Searching Arrays

An example of searching arrays is as shown below.

```
SELECT * FROM monthly_savings WHERE saving_per_quarter[1] = 10000 OR  
saving_per_quarter[2] = 10000 OR  
saving_per_quarter[3] = 10000 OR  
saving_per_quarter[4] = 10000;
```

If the size of array is known, above search method can be used. Else, the following example shows how to search when size is not known.

```
SELECT * FROM monthly_savings WHERE 10000 = ANY (saving_per_quarter);
```

Composite Types

This type represents a list of field names and their data types, i.e., structure of a row or record of a table.

Declaration of Composite Types

The following example shows how to declare a composite type:

```
CREATE TYPE inventory_item AS (  
    name text,  
    supplier_id integer,  
    price numeric  
);
```

This data type can be used in the create tables as below:

```
CREATE TABLE on_hand (  
    item inventory_item,  
    count integer  
);
```

Composite Value Input

Composite values can be inserted as a literal constant, enclosing the field values within parentheses and separating them by commas. An example is as below:

```
INSERT INTO on_hand VALUES (ROW('fuzzy dice', 42, 1.99), 1000);
```

This is valid for the *inventory_item* defined above. The ROW keyword is actually optional as long as you have more than one field in the expression.

Accessing Composite Types

To access a field of a composite column, use a dot followed by the field name, much like selecting a field from a table name. For example, to select some subfields from our on_hand example table, the query would be as shown below:

```
SELECT (item).name FROM on_hand WHERE (item).price > 9.99;
```

you can even use the table name as well (for instance in a multitable query), like this:

```
SELECT (on_hand.item).name FROM on_hand WHERE (on_hand.item).price > 9.99;
```

Range Types

Range types represent data type that uses a range of data. Range type can be discrete ranges (e.g., all integer values 1 to 10) or continuous ranges (e.g., any point in time between 10:00am and 11:00am).

The built-in range types available include ranges:

- `int4range` - Range of integer
- `int8range` - Range of big int
- `numrange` - Range of numeric
- `tsrange` - Range of timestamp without time zone

- `tstzrange` - Range of timestamp with time zone
- `daterange` - Range of date

Custom range types can be created to make new types of ranges available, such as IP address ranges using the `inet` type as a base, or float ranges using the `float` data type as a base.

Range types support inclusive and exclusive range boundaries using the `[]` and `()` characters, respectively, e.g., `'[4,9]'` represents all integers starting from and including 4 up to but not including 9.

Object Identifier Types

Object identifiers (OIDs) are used internally by PostgreSQL as primary keys for various system tables. If *WITH OIDS* is specified or *default_with_oids* configuration variable is enabled, only in such cases OIDs are added to user-created tables. The following table lists several alias types. The OID alias types have no operations of their own except for specialized input and output routines.

Name	References	Description	Value Example
<code>oid</code>	<code>any</code>	numeric object identifier	564182
<code>regproc</code>	<code>pg_proc</code>	function name	<code>sum</code>
<code>regprocedure</code>	<code>pg_proc</code>	function with argument types	<code>sum(int4)</code>
<code>regoper</code>	<code>pg_operator</code>	operator name	<code>+</code>
<code>regoperator</code>	<code>pg_operator</code>	operator with argument types	<code>*(integer,integer)</code> or <code>-(NONE,integer)</code>
<code>regclass</code>	<code>pg_class</code>	relation name	<code>pg_type</code>
<code>regtype</code>	<code>pg_type</code>	data type name	<code>integer</code>
<code>regconfig</code>	<code>pg_ts_config</code>	text search configuration	<code>english</code>
<code>regdictionary</code>	<code>pg_ts_dict</code>	text search dictionary	<code>simple</code>

Pseudo Types

The PostgreSQL type system contains a number of special-purpose entries that are collectively called pseudo-types. A pseudo-type cannot be used as a column data type, but it can be used to declare a function's argument or result type. The table below lists the existing pseudo-types.

Name	Description
<code>any</code>	Indicates that a function accepts any input data type.
<code>anyelement</code>	Indicates that a function accepts any data type.
<code>anyarray</code>	Indicates that a function accepts any array data type.
<code>anynonarray</code>	Indicates that a function accepts any non-array data type.
<code>anyenum</code>	Indicates that a function accepts any enum data type.
<code>anyrange</code>	Indicates that a function accepts any range data type.
<code>cstring</code>	Indicates that a function accepts or returns a null-terminated C string.
<code>internal</code>	Indicates that a function accepts or returns a server-internal data type.

language_handler	A procedural language call handler is declared to return language_handler.
fdw_handler	A foreign-data wrapper handler is declared to return fdw_handler.
record	Identifies a function returning an unspecified row type.
trigger	A trigger function is declared to return trigger.
void	Indicates that a function returns no value.

POSTGRESQL CREATE DATABASE

This chapter discusses about how to create a new database in your PostgreSQL. PostgreSQL provides two ways of creating a new database:

- Using CREATE DATABASE, an SQL command.
- Using *createdb* a command-line executable.

Using CREATE DATABASE

This command will create a database from PostgreSQL shell prompt, but you should have appropriate privilege to create database. By default, the new database will be created by cloning the standard system database *template1*.

Syntax

The basic syntax of CREATE DATABASE statement is as follows:

```
CREATE DATABASE dbname;
```

where *dbname* is the name of a database to create.

Example

Following is a simple example, which will create **testdb** in your PostgreSQL schema:

```
postgres=# CREATE DATABASE testdb;
postgres=#
```

Using createdb Command

PostgreSQL command line executable *createdb* is a wrapper around the SQL command *CREATE DATABASE*. The only difference between this command and SQL command *CREATE DATABASE* is that the former can be directly run from the command line and it allows a comment to be added into the database, all in one command.

Syntax

The syntax for *createdb* is as shown below:

```
createdb [option...] [dbname [description]]
```

Parameters

Table below lists the parameters with their descriptions.

Parameter	Description
dbname	The name of a database to create.

description	Specifies a comment to be associated with the newly created database.
options	command-line arguments, which createdb accepts.

Options

The following table lists the command-line arguments createdb accepts:

Option	Description
-D tablespace	Specifies the default tablespace for the database.
-e	Echo the commands that createdb generates and sends to the server.
-E encoding	Specifies the character encoding scheme to be used in this database.
-l locale	Specifies the locale to be used in this database.
-T template	Specifies the template database from which to build this database.
--help	Show help about dropdb command line arguments, and exit.
-h host	Specifies the host name of the machine on which the server is running.
-p port	Specifies the TCP port or the local Unix domain socket file extension on which the server is listening for connections.
-U username	User name to connect as.
-w	Never issue a password prompt.
-W	Force createdb to prompt for a password before connecting to a database.

Open the command prompt and go to the directory where PostgreSQL is installed. Go to the bin directory and execute the following command to create a database.

```
createdb -h localhost -p 5432 -U postgres testdb
password *****
```

Above command will prompt you for password of the PostgreSQL admin user which is **postgres** by default so provide password and proceed to create your new dataabse.

Once a database is created using either of the above-mentioned methods, you can check it in the list of databases using \l command as follows:

```
postgres-# \l
                                List of databases
  Name      | Owner   | Encoding | Collate | Ctype   | Access privileges
-----+-----+-----+-----+-----+-----
 postgres   | postgres | UTF8      | C       | C       | 
 template0  | postgres | UTF8      | C       | C       | =c/postgres +
            |          |           |         |         | postgres=CTc/postgres
 template1  | postgres | UTF8      | C       | C       | =c/postgres +
            |          |           |         |         | postgres=CTc/postgres
 testdb     | postgres | UTF8      | C       | C       | 
(4 rows)

postgres-#
```

POSTGRESQL - SELECT DATABASE

This chapter explains various methods of accessing the database. Assume that we have already created a database in our previous chapter. You can select database using either of the following methods:

- Database SQL Prompt
- OS Command Prompt

Database SQL Prompt

Assume you already have launched your PostgreSQL client and you have landed at the following SQL prompt:

```
postgres=#
```

You can check available database list using `\l`, i.e., backslash `l` command as follows:

```
postgres=# \l
```

List of databases					
Name	Owner	Encoding	Collate	Ctype	Access privileges
postgres	postgres	UTF8	C	C	
template0	postgres	UTF8	C	C	=c/postgres postgres=CTc/postgres +
template1	postgres	UTF8	C	C	=c/postgres postgres=CTc/postgres +
testdb	postgres	UTF8	C	C	

(4 rows)

```
postgres=#
```

Now, type the below command to connect/select a desired database, here we will connect to the `testdb` database:

```
postgres=# \c testdb;
psql (9.2.4)
Type "help" for help.
You are now connected to database "testdb" as user "postgres".
testdb=#
```

OS Command Prompt

You can select your database from command prompt itself at the time when you log in to your database. Following is the simple example:

```
psql -h localhost -p 5432 -U postgres testdb
Password for user postgres: ****
psql (9.2.4)
Type "help" for help.
You are now connected to database "testdb" as user "postgres".
testdb=#
```

You are now logged into PostgreSQL `testdb` and ready to execute your commands inside `testdb`. To exit from the database, you can use the command `\q`.

POSTGRESQL - DROP DATABASE

In this chapter we will discuss how to delete the database in PostgreSQL. There are two options to delete a database:

1. Using `DROP DATABASE`, an SQL command.
2. Using `dropdb` a command-line executable.

| Be careful before using this operation because by deleting an existing database would result in

| *loss of complete information stored in the database.*

Using DROP DATABASE

This command drops a database. It removes the catalog entries for the database and deletes the directory containing the data. It can only be executed by the database owner. This command cannot be executed while you or anyone else is connected to the target database (connect to postgres or any other database to issue this command).

Syntax

The syntax for DROP DATABASE is as below:

```
DROP DATABASE [ IF EXISTS ] name
```

Parameters

Table below lists the parameters with their descriptions.

Parameter	Description
IF EXISTS	Do not throw an error if the database does not exist. A notice is issued in this case.
name	The name of the database to remove.

We cannot drop a database that has any open connections, including our own connection from psql or pgAdmin III. We must switch to another database or template1 if we want to delete the database we are currently connected to. Thus, it might be more convenient to use the program dropdb instead which is a wrapper around this command.

Example

Following is a simple example, which will delete **testdb** from your PostgreSQL schema:

```
postgres=# DROP DATABASE testdb;  
postgres-
```

Using dropdb Command

PostgreSQL command line executable **dropdb** is command-line wrapper around the SQL command *DROP DATABASE*. There is no effective difference between dropping databases via this utility and via other methods for accessing the server. dropdb destroys an existing PostgreSQL database. The user, who executes this command must be a database superuser or the owner of the database.

Syntax

The syntax for *createdb* is as shown below:

```
dropdb [option...] dbname
```

Parameters

Table below lists the parameters with their descriptions.

Parameter	Description
-----------	-------------

dbname	The name of a database to be deleted.
option	command-line arguments, which dropdb accepts.

Options

The following table lists the command-line arguments dropdb accepts:

Option	Description
-e	Shows the commands being sent to the server.
-i	Issues a verification prompt before doing anything destructive.
-V	Print the dropdb version and exit.
--if-exists	Do not throw an error if the database does not exist. A notice is issued in this case.
--help	Show help about dropdb command-line arguments, and exit.
-h host	Specifies the host name of the machine on which the server is running.
-p port	Specifies the TCP port or the local UNIX domain socket file extension on which the server is listening for connections.
-U username	User name to connect as.
-w	Never issue a password prompt.
-W	Force dropdb to prompt for a password before connecting to a database.
--maintenance-db=dbname	Specifies the name of the database to connect to in order to drop the target database.

Example

Following example demonstrates deleting a database from OS command prompt:

```
dropdb -h localhost -p 5432 -U postgres testdb
Password for user postgres: ****
```

The above command drops database **testdb**. Here, I've used the **postgres** (found under the pg_roles of template1) user name to drop the database.

POSTGRESQL - CREATE TABLE

The PostgreSQL CREATE TABLE statement is used to create a new table in any of the given database.

Syntax

Basic syntax of CREATE TABLE statement is as follows:

```
CREATE TABLE table_name(
    column1 datatype,
    column2 datatype,
    column3 datatype,
    .....
    columnN datatype,
    PRIMARY KEY( one or more columns )
);
```

CREATE TABLE is the keyword telling the database system to create a new table. The unique name or identifier for the table follows the CREATE TABLE statement. Initially empty table in the current database and will be owned by the user issuing the command.

Then in brackets comes the list defining each column in the table and what sort of data type it is. The syntax becomes clearer with an example below.

Examples

Following is an example, which creates a COMPANY table with ID as primary key and NOT NULL are the constraints showing that these fields can not be NULL while creating records in this table:

```
CREATE TABLE COMPANY (  
  ID INT PRIMARY KEY     NOT NULL,  
  NAME           TEXT     NOT NULL,  
  AGE            INT       NOT NULL,  
  ADDRESS        CHAR(50),  
  SALARY         REAL  
);
```

Let us create one more table, which we will use in our exercises in subsequent chapters:

```
CREATE TABLE DEPARTMENT(  
  ID INT PRIMARY KEY     NOT NULL,  
  DEPT          CHAR(50)  NOT NULL,  
  EMP_ID        INT       NOT NULL  
);
```

You can verify if your table has been created successfully using \d command, which will be used to list down all the tables in an attached database.

```
testdb=# \d
```

Above PostgreSQL statement will produce the following result:

```
           List of relations  
Schema |   Name   | Type  | Owner  
-----+-----+-----+-----  
public | company  | table | postgres  
public | department | table | postgres  
(2 rows)
```

Use \d **tablename** to describe each table as shown below:

```
testdb=# \d company
```

Above PostgreSQL statement will produce the following result:

```
           Table "public.company"  
Column      |      Type      | Modifiers  
-----+-----+-----  
id           | integer        | not null  
name         | text           | not null  
age          | integer        | not null  
address      | character(50)  |  
salary       | real           |  
join_date   | date           |  
Indexes:  
"company_pkey" PRIMARY KEY, btree (id)
```

POSTGRESQL - DROP TABLE

The PostgreSQL DROP TABLE statement is used to remove a table definition and all associated data, indexes,

rules, triggers, and constraints for that table.

You have to be careful while using this command because once a table is deleted then all the information available in the table would also be lost forever.

Syntax

Basic syntax of DROP TABLE statement is as follows.

```
DROP TABLE table_name;
```

Example

We had created the tables DEPARTMENT and COMPANY in the previous chapter. First verify these tables (use \d to list the tables):

```
testdb=# \d
```

This would produce the following result:

```
           List of relations
Schema |   Name   | Type | Owner
-----+-----+-----+-----
public | company  | table | postgres
public | department | table | postgres
(2 rows)
```

This means DEPARTMENT and COMPANY tables are present. So let us drop them as follows:

```
testdb=# drop table department, company;
```

This would produce the following result:

```
DROP TABLE
testdb=# \d
relations found.
testdb=#
```

The message returned DROP TABLE indicates that drop command had been executed successfully.

POSTGRESQL SCHEMA

A **schema** is a named collection of tables. A schema can also contain views, indexes, sequences, data types, operators, and functions. Schemas are analogous to directories at the operating system level, except that schemas cannot be nested. PostgreSQL statement CREATE SCHEMA creates a schema.

Syntax

The basic syntax CREATE SCHEMA is as follows:

```
CREATE SCHEMA name;
```

Where *name* is the name of the schema.

Syntax to Create table in Schema

The basic syntax to create table in schema is as follows:

```
CREATE TABLE myschema.mytable (
```

```
...  
);
```

Example

Let us see an example for creating a schema. Connect to the database *testdb* and create a schema *myschema* as follows:

```
testdb=# create schema myschema;  
CREATE SCHEMA
```

The message "CREATE SCHEMA" signifies that the schema is created successfully.

Now, let us create a table in the above schema as follows:

```
testdb=# create table myschema.company(  
  ID    INT          NOT NULL,  
  NAME  VARCHAR (20)  NOT NULL,  
  AGE   INT          NOT NULL,  
  ADDRESS CHAR (25) ,  
  SALARY DECIMAL (18, 2),  
  PRIMARY KEY (ID)  
);
```

This will create an empty table. You can verify the table created with the command below:

```
testdb=# select * from myschema.company;
```

This would produce the following result:

```
 id | name | age | address | salary  
----+-----+-----+-----+-----  
(0 rows)
```

Syntax to Drop schema

To drop a schema if it's empty (all objects in it have been dropped), then use:

```
DROP SCHEMA myschema;
```

To drop a schema including all contained objects, use:

```
DROP SCHEMA myschema CASCADE;
```

Advantages of using a Schema

- It allows many users to use one database without interfering with each other.
- It organizes database objects into logical groups to make them more manageable.
- Third-party applications can be put into separate schemas so they do not collide with the names of other objects.

POSTGRESQL - INSERT QUERY

The PostgreSQL **INSERT INTO** statement allows one to insert new rows into a table. One can insert a single row at a time or several rows as a result of a query.

Syntax

Basic syntax of INSERT INTO statement is as follows.

```
INSERT INTO TABLE_NAME (column1, column2, column3,...columnN)]  
VALUES (value1, value2, value3,...valueN);
```

- Here, column1, column2,...columnN are the names of the columns in the table into which you want to insert data.
- The target column names can be listed in any order. The values supplied by the VALUES clause or query are associated with the explicit or implicit column list left-to-right.

You may not need to specify the column(s) name in the SQL query if you are adding values for all the columns of the table. But make sure the order of the values is in the same order as the columns in the table. The SQL INSERT INTO syntax would be as follows:

```
INSERT INTO TABLE_NAME VALUES (value1,value2,value3,...valueN);
```

Output

The following table summarizes the output messages and their meaning:

Output Message	Description
INSERT oid 1	Message returned if only one row was inserted. oid is the numeric OID of the inserted row.
INSERT o #	Message returned if more than one rows were inserted. # is the number of rows inserted.

Examples

Let us create COMPANY table in **testdb** as follows:

```
CREATE TABLE COMPANY (  
  ID INT PRIMARY KEY      NOT NULL,  
  NAME          TEXT      NOT NULL,  
  AGE           INT       NOT NULL,  
  ADDRESS       CHAR(50),  
  SALARY        REAL,  
  JOIN_DATE     DATE  
);
```

Following example inserts a row into the COMPANY table:

```
INSERT INTO COMPANY (ID,NAME,AGE,ADDRESS,SALARY,JOIN_DATE) VALUES (1, 'Paul', 32, 'California',  
20000.00 , '2001-07-13');
```

Following example is to insert a row; here *salary* column is omitted and therefore it will have the default value:

```
INSERT INTO COMPANY (ID,NAME,AGE,ADDRESS,JOIN_DATE) VALUES (2, 'Allen', 25, 'Texas', '2007-12-  
13');
```

Following example uses the DEFAULT clause for the ADDRESS columns rather than specifying a value:

```
INSERT INTO COMPANY (ID,NAME,AGE,ADDRESS,SALARY,JOIN_DATE) VALUES (3, 'Teddy', 23, 'Norway',  
20000.00, DEFAULT );
```

Following example inserts multiple rows using the multirow VALUES syntax:

```
INSERT INTO COMPANY (ID,NAME,AGE,ADDRESS,SALARY,JOIN_DATE) VALUES (4, 'Mark', 25, 'Rich-Mond ',  
65000.00, '2007-12-13' ), (5, 'David', 27, 'Texas', 85000.00 , '2007-12-13');
```

All the above statements would create the following records in COMPANY table. Next chapter will teach you how to display all these records from a table.

ID	NAME	AGE	ADDRESS	SALARY	JOIN_DATE
1	Paul	32	California	20000.0	2001-07-13
2	Allen	25	Texas		2007-12-13
3	Teddy	23	Norway	20000.0	
4	Mark	25	Rich-Mond	65000.0	2007-12-13
5	David	27	Texas	85000.0	2007-12-13

POSTGRESQL - SELECT QUERY

PostgreSQL **SELECT** statement is used to fetch the data from a database table which returns data in the form of result table. These result tables are called result-sets.

Syntax:

The basic syntax of SELECT statement is as follows:

```
SELECT column1, column2, columnN FROM table_name;
```

Here, column1, column2...are the fields of a table whose values you want to fetch. If you want to fetch all the fields available in the field then you can use the following syntax:

```
SELECT * FROM table_name;
```

Example:

Consider the table [COMPANY](#) having records as follows:

```
id | name | age | address | salary
---+-----+-----+-----+-----
1 | Paul | 32 | California | 20000
2 | Allen | 25 | Texas | 15000
3 | Teddy | 23 | Norway | 20000
4 | Mark | 25 | Rich-Mond | 65000
5 | David | 27 | Texas | 85000
6 | Kim | 22 | South-Hall | 45000
7 | James | 24 | Houston | 10000
(7 rows)
```

Following is an example, which would fetch ID, Name and Salary fields of the customers available in CUSTOMERS table:

```
testdb=# SELECT ID, NAME, SALARY FROM COMPANY ;
```

This would produce the following result:

```
id | name | salary
---+-----+-----
1 | Paul | 20000
2 | Allen | 15000
3 | Teddy | 20000
4 | Mark | 65000
5 | David | 85000
6 | Kim | 45000
7 | James | 10000
(7 rows)
```

If you want to fetch all the fields of CUSTOMERS table, then use the following query:


```
testdb=# SELECT * FROM COMPANY;
```

This would produce the following result:

id	name	age	address	salary
1	Paul	32	California	20000
2	Allen	25	Texas	15000
3	Teddy	23	Norway	20000
4	Mark	25	Rich-Mond	65000
5	David	27	Texas	85000
6	Kim	22	South-Hall	45000
7	James	24	Houston	10000

(7 rows)

POSTGRESQL - WHERE CLAUSE

The PostgreSQL WHERE clause is used to specify a condition while fetching the data from single table or joining with multiple tables.

If the given condition is satisfied only then it returns specific value from the table. You can filter out rows that you don't want included in the result-set by using the WHERE clause.

The WHERE clause not only is used in SELECT statement, but it is also used in UPDATE, DELETE statement, etc., which we would examine in subsequent chapters.

Syntax

The basic syntax of SELECT statement with WHERE clause is as follows:

```
SELECT column1, column2, columnN
FROM table_name
WHERE [search_condition]
```

You can specify a *search_condition* using [comparison or logical operators](#). like >, <, =, LIKE, NOT, etc. Below examples would make this concept clear.

Example:

Consider the table [COMPANY](#) having records as follows:

```
testdb# select * from COMPANY;
 id | name  | age | address  | salary
----+-----+----+-----+-----
  1 | Paul  |  32 | California | 20000
  2 | Allen |  25 | Texas     | 15000
  3 | Teddy |  23 | Norway    | 20000
  4 | Mark  |  25 | Rich-Mond | 65000
  5 | David |  27 | Texas     | 85000
  6 | Kim   |  22 | South-Hall | 45000
  7 | James |  24 | Houston   | 10000
(7 rows)
```

Here are simple examples showing usage of PostgreSQL Logical Operators. Following SELECT statement will list down all the records where AGE is greater than or equal to 25 **AND** salary is greater than or equal to 65000.00:

```
testdb=# SELECT * FROM COMPANY WHERE AGE >= 25 AND SALARY >= 65000;
```

Above PostgreSQL statement will produce the following result:

id	name	age	address	salary
4	Mark	25	Rich-Mond	65000
5	David	27	Texas	85000

(2 rows)

Following SELECT statement lists down all the records where AGE is greater than or equal to 25 **OR** salary is greater than or equal to 65000.00:

```
testdb=# SELECT * FROM COMPANY WHERE AGE >= 25 OR SALARY >= 65000;
```

Above PostgreSQL statement will produce the following result:

id	name	age	address	salary
1	Paul	32	California	20000
2	Allen	25	Texas	15000
4	Mark	25	Rich-Mond	65000
5	David	27	Texas	85000

(4 rows)

Following SELECT statement lists down all the records where AGE is not NULL which means all the records because none of the record is having AGE equal to NULL:

```
testdb=# SELECT * FROM COMPANY WHERE AGE IS NOT NULL;
```

Above PostgreSQL statement will produce the following result:

id	name	age	address	salary
1	Paul	32	California	20000
2	Allen	25	Texas	15000
3	Teddy	23	Norway	20000
4	Mark	25	Rich-Mond	65000
5	David	27	Texas	85000
6	Kim	22	South-Hall	45000
7	James	24	Houston	10000

(7 rows)

Following SELECT statement lists down all the records where NAME starts with 'Pa', does not matter what comes after 'Pa'.

```
testdb=# SELECT * FROM COMPANY WHERE NAME LIKE 'Pa%';
```

Above PostgreSQL statement will produce the following result:

id	name	age	address	salary
1	Paul	32	California	20000

Following SELECT statement lists down all the records where AGE value is either 25 or 27:

```
testdb=# SELECT * FROM COMPANY WHERE AGE IN ( 25, 27 );
```

Above PostgreSQL statement will produce the following result:

id	name	age	address	salary
2	Allen	25	Texas	15000
4	Mark	25	Rich-Mond	65000
5	David	27	Texas	85000

(3 rows)

Following SELECT statement lists down all the records where AGE value is neither 25 nor 27:

```
testdb=# SELECT * FROM COMPANY WHERE AGE NOT IN ( 25, 27 );
```

Above PostgreSQL statement will produce the following result:

id	name	age	address	salary
1	Paul	32	California	20000
3	Teddy	23	Norway	20000
6	Kim	22	South-Hall	45000
7	James	24	Houston	10000

(4 rows)

Following SELECT statement lists down all the records where AGE value is in BETWEEN 25 AND 27:

```
testdb=# SELECT * FROM COMPANY WHERE AGE BETWEEN 25 AND 27;
```

Above PostgreSQL statement will produce the following result:

id	name	age	address	salary
2	Allen	25	Texas	15000
4	Mark	25	Rich-Mond	65000
5	David	27	Texas	85000

(3 rows)

Following SELECT statement makes use of SQL sub-query where sub-query finds all the records with AGE field having SALARY > 65000 and later WHERE clause is being used along with EXISTS operator to list down all the records where AGE from the outside query exists in the result returned by sub-query:

```
testdb=# SELECT AGE FROM COMPANY
        WHERE EXISTS (SELECT AGE FROM COMPANY WHERE SALARY > 65000);
```

Above PostgreSQL statement will produce the following result:

age
32
25
23
25
27
22
24

(7 rows)

Following SELECT statement makes use of SQL sub-query where subquery finds all the records with AGE field having SALARY > 65000 and later WHERE clause is being used along with > operator to list down all the records where AGE from outside query is greater than the age in the result returned by sub-query:

```
testdb=# SELECT * FROM COMPANY
        WHERE AGE > (SELECT AGE FROM COMPANY WHERE SALARY > 65000);
```

Above PostgreSQL statement will produce the following result:

id	name	age	address	salary
1	Paul	32	California	20000

POSTGRESQL - UPDATE QUERY

The PostgreSQL **UPDATE** Query is used to modify the existing records in a table. You can use WHERE clause with UPDATE query to update selected rows otherwise all the rows would be updated.

Syntax:

The basic syntax of UPDATE query with WHERE clause is as follows:

```
UPDATE table_name
SET column1 = value1, column2 = value2..., columnN = valueN
WHERE [condition];
```

You can combine N number of conditions using AND or OR operators.

Example:

Consider the table [COMPANY](#) having records as follows:

```
testdb# select * from COMPANY;
 id | name  | age | address      | salary
-----+-----+-----+-----+-----
  1 | Paul  |  32 | California   |  20000
  2 | Allen |  25 | Texas        |  15000
  3 | Teddy |  23 | Norway       |  20000
  4 | Mark  |  25 | Rich-Mond    |  65000
  5 | David |  27 | Texas        |  85000
  6 | Kim   |  22 | South-Hall   |  45000
  7 | James |  24 | Houston      |  10000
(7 rows)
```

Following is an example, which would update ADDRESS for a customer, whose ID is 6:

```
testdb=# UPDATE COMPANY SET SALARY = 15000 WHERE ID = 3;
```

Now, COMPANY table would have the following records:

```
 id | name  | age | address      | salary
-----+-----+-----+-----+-----
  1 | Paul  |  32 | California   |  20000
  2 | Allen |  25 | Texas        |  15000
  4 | Mark  |  25 | Rich-Mond    |  65000
  5 | David |  27 | Texas        |  85000
  6 | Kim   |  22 | South-Hall   |  45000
  7 | James |  24 | Houston      |  10000
  3 | Teddy |  23 | Norway       |  15000
(7 rows)
```

If you want to modify all ADDRESS and SALARY column values in COMPANY table, you do not need to use WHERE clause and UPDATE query would be as follows:

```
testdb=# UPDATE COMPANY SET ADDRESS = 'Texas', SALARY=20000;
```

Now, COMPANY table will have the following records:

```
 id | name  | age | address | salary
-----+-----+-----+-----+-----
  1 | Paul  |  32 | Texas   |  20000
  2 | Allen |  25 | Texas   |  20000
  4 | Mark  |  25 | Texas   |  20000
  5 | David |  27 | Texas   |  20000
  6 | Kim   |  22 | Texas   |  20000
  7 | James |  24 | Texas   |  20000
  3 | Teddy |  23 | Texas   |  20000
(7 rows)
```

POSTGRESQL - DELETE QUERY

The PostgreSQL **DELETE** Query is used to delete the existing records from a table. You can use WHERE clause with DELETE query to delete selected rows, otherwise all the records would be deleted.

Syntax:

The basic syntax of DELETE query with WHERE clause is as follows:

```
DELETE FROM table_name
WHERE [condition];
```

You can combine N number of conditions using AND or OR operators.

Example:

Consider the table [COMPANY](#) having records as follows:

```
# select * from COMPANY;
id | name  | age | address    | salary
---+-----+---+-----+-----
 1 | Paul  | 32  | California | 20000
 2 | Allen | 25  | Texas      | 15000
 3 | Teddy | 23  | Norway     | 20000
 4 | Mark  | 25  | Rich-Mond  | 65000
 5 | David | 27  | Texas      | 85000
 6 | Kim   | 22  | South-Hall | 45000
 7 | James | 24  | Houston    | 10000
(7 rows)
```

Following is an example which would DELETE a customer, whose ID is 7:

```
testdb=# DELETE FROM COMPANY WHERE ID = 7;
```

Now COMPANY table will have following records:

```
id | name  | age | address    | salary
---+-----+---+-----+-----
 1 | Paul  | 32  | California | 20000
 3 | Teddy | 23  | Norway     | 20000
 4 | Mark  | 25  | Rich-Mond  | 65000
 5 | David | 27  | Texas      | 85000
 6 | Kim   | 22  | South-Hall | 45000
 7 | James | 24  | Houston    | 10000
(6 rows)
```

If you want to DELETE all the records from COMPANY table, you do not need to use WHERE clause with DELETE queries, which would be as follows:

```
testdb=# DELETE FROM COMPANY;
```

Now, COMPANY table does not have any record because all the records have been deleted by DELETE statement.