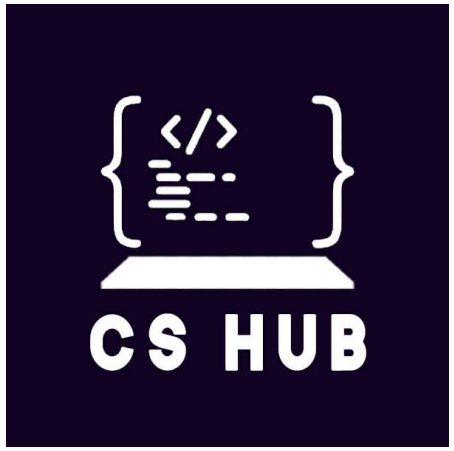
Welcome To Computer Science HUB



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PHP & PostgreSQL

Features of PostgreSQL| Data types

CS HUB

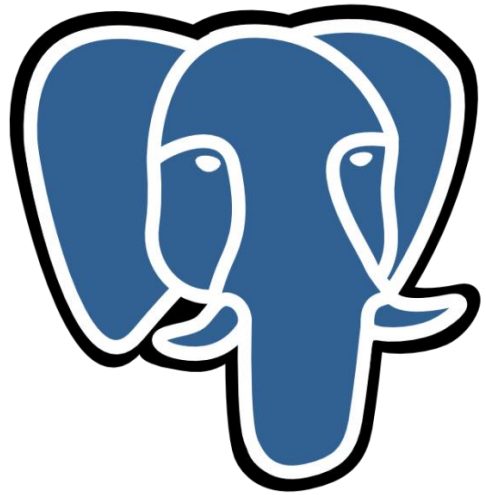
BCA5B09 |BCS5B09-Web Programming using PHP

Unit V [10 T + 10 L]

- PHP & PostgreSQL: Features of PostgreSQL, data types
- PostgreSQL commands – CREATE DATABASE, CREATE TABLE, DESCRIBE TABLE, SELECT, SELECT INTO, CREATE AS, DELETE, UPDATE, INSERT.
- **PHP - PostgreSQL Integration:** Establishing Database Connection (pg_connect(), pg_connection_status(), pg_dbname()),
- Getting Error String (pg_last_error()),
- Closing database Connection (pg_close())
- Executing SQL statements (pg_query(), pg_execute()),
- Retrieving Data (pg_fetch_row(), pg_fetch_array(), pg_fetch_all(), pg_fetch_assoc(), pg_fetch_object(), pg_num_rows(), pg_num_fields() pg_affected_rows(), pg_num_rows(), pg_free_result())
- Insertion and Deletion of data using PHP, Displaying data from PostrgreSQL database in webpage.
- Introduction to AJAX - Implementation of AJAX in PHP - Simple example for partial page update.

PostgreSQL

- Powerful opensource ,general purpose and **object- relational** database system that uses and extends sql language combined with many features
- Originated from POSTGRES project led by Michael Stonebraker
- Released as postgres95 in 1995
- Re-released as postgreSQL 6.0 in 1997
- Latest version 15.1 on October 13, 2022



PostgreSQL

Features of PostgreSql

- **Data integrity(Accuracy and consistency of data over its lifetime)**
- Fully **ACID** compliant (Atomicity, Consistency, Isolation,Durability)
- Well known for its firm referential and transactional integrity
- Many data integrity features are included like primary key , restricting and cascading foreign keys, unique constraints , not null constraints etc.

Features

- **Scalability**
- The term **Scalability** means the ability of a software system to grow as the business using it grows
- PostgreSQL provides some features that help you to build a scalable solution
- It uses multiple CPU cores to execute a single query faster with the parallel query feature
- When configured properly, it can use all available memory for caching
- The size of the database is not limited; PostgreSQL can utilize multiple hard disks when multiple tablespaces are created; with partitioning, the hard disks could be accessed simultaneously, which makes data processing faster

Features

- **Feature richness**
  - Comprehensive sophisticated database system offering numerous features like complex SQL queries , SQL sub-selects, foreign keys, trigger, views, transactions, multiversion concurrency control (MVCC),streaming replication, hot standby etc.
- **Reliability and stability**
  - Reliability is important in enterprise level applications that handle business critical data.
  - For this PostgreSQL provide support for hot standby servers, point-in-time recovery,different types of replications

Features

- **Security**
  - Supports secure and encrypted SSL connections and provides various authentication methods including password authentication , client certificates and external authentication services
- **Conformance to the SQL standard**
  - PostgreSQL provides a high rate of standard conformance to the ANSI SQL standard, supporting 160 out of 179 mandatory features , as well as many optional features
- **Transaction Support**
  - Provides full support for ACID properties
  - Ensure effective transaction isolation using multiversion concurrency control method(MVCC)
  - This method allows to avoid locking in all cases except for concurrent update of the same row by different processes
  - Reading transactions never block writing ones and vice versa

Features

- **Query planner**
  - Uses a cost-based query planner
  - Using the collected statistics and taking into account both disk operations and CPU time, a planner can optimize most complex queries
- **Indexing**
  - Apart from traditional B-trees ,PostgreSQL provides various index methods like GiST,SP-GiST,GIN,BRIN,Bloom etc
- **Cross-platform Support**
  - Runs on UNIX OS including server and client linux distributions, FreeBSD,solaris,macOS,aswell as windows

Features

- **Extensibility**
  - One of the main advantages of PostgreSQL architecture
  - Without changing the core system code, users can add new features, include new datatypes, functions and operators to work with new datatypes,indexed access methods, server programming languages,loadable extensions etc.
- **Availability**
  - PostgreSQL license allows unlimited use of DBMS, code modification as well as integrating PostgreSQL into other products including commercial and closed –source software
- **Independence**
  - Does not belong to any company. Developed by international community which includes Russian developers

POSTGRESQL DATATYPES

- NUMERIC
- MONEY
- CHARACTER
- BINARY
- DATE/TIME
- BOOLEAN
- ENUMERATED
- GEOMETRIC
- NETWORK ADDRESS TYPE
- BIT STRING TYPE
- ARRAY TYPE

NUMERIC

- Numeric types consist of two-byte, four-byte, and eight-byte integers, four-byte and eight-byte floating-point numbers, and selectable-precision decimals.

NAME	STORAGE SIZE	DESCRIPTION
smallint	2 bytes	small-range integer
Integer	4 bytes	typical choice for integer
Bigint	8 bytes	large-range integer
Decimal	variable	user-specified precision,exact
Numeric	Variable	user-specified precision,exact
Real	4 bytes	variable-precision(6 decimal digits)
Double precision	8 bytes	variable-precision(15 decimal digits)
Smallserial	2 bytes	small autoincrementing integer
Serial	4 bytes	autoincrementing integer
Bigserial	8 bytes	large autoincrementing integer

Monetary type

- Stores a currency amount with a fixed fractional precision
- Values of numeric,int and bigint datatypes can be cast to money
- money- 8 bytes

character

Name	Decription
Character varying(n),varchar(n)	Variable length with limit
Character(n), char(n)	Fixed length
Text	Variable unlimited length

binary

- bytea allows storage of variable length binary string

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

Date/time

Name	Storage size	Description
timestamp[(p)] [without time zone]	8 bytes	both date and time (no time zone)
timestamp[(p)] with time zone	8 bytes	both date and time, with time zone
Date	4 bytes	date (no time of day)
Time[(p)] [without time zone]	8 bytes	time of day (no date)
Time[(p)] with time zone	12 bytes	times of day only, with time zone
Interval[fields][(p)]	12 bytes	time interval

boolean

- Can have true,false and unknown state(represented by SQL null value)
- Storage size 1 byte

Enumerated type

- Datatypes that comprise a static, ordered set of values
- Need to be created using CREATE TYPE command
- CREATE TYPE week as ENUM(‘MON’, ‘TUE’, ‘WED’, ‘THU’, ‘FRI’, ‘SAT’);
- Enumerated, once created, can be used like any other types.

GEOMETRIC TYPE

- Represents 2-d spatial objects.
- Most fundamental type is point
- It forms the basis for all of the other types.

NAME	STORAGE	REPRESENTATION
point	16 bytes	point on a plane(x,y)
Line	32 bytes	Infinite line
Lseg	32 bytes	Finite line segment
Box	32 bytes	Rectangular box
Path	16+16n bytes	Closed path(polygon)
Polygon	40+16n	Polygon (similar to closed path)
Circle	24 bytes	circle

Network address type

- Postgresql offers datatypes to store IPv4,IPv6 and MAC addresses
- These types offer input error checking and specialized operators and functions

Name	Storage	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 address

Bit string

- Used to store bit masks
- Either 0 or 1
- 2 types
  - bit(n)
  - bit varying(n)

Array type

- Postgresql alllows to define a column of a table as a variable length multidimensional array
- CREATE TABLE monthly_savings(name text , saving integer[],scheme text[][]);

Thank You !!