02 Database and SQL

潘得龍

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Database Services, Solutions and Features

Database In-Memory →

Multitenant →

Real Application Clusters (RAC) →

Application Development →

Data Warehousing and Big Data →

High Availability →

Machine Learning →

Security →

Database Upgrades

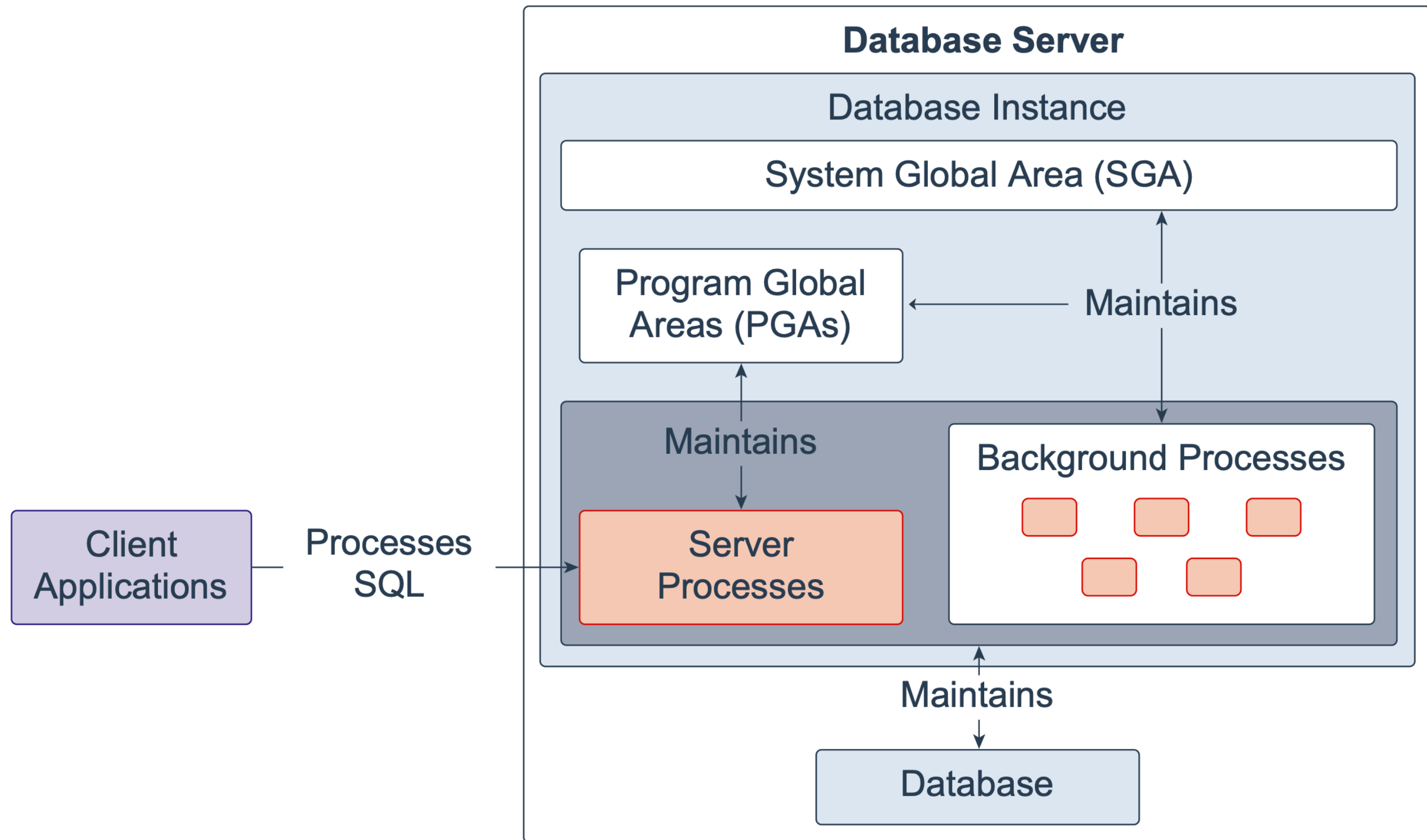|	
Database 19c Enterprise/Standard Editions	Grid Infrastructure
Database 18c Enterprise/Standard Editions	Instant Client
Database 12c Enterprise/Standard Editions	MySQL
Database 11g Enterprise/Standard Editions	NoSQL Database
Database 18c Express Edition	Oracle Blockchain Platform Enterprise Edition
Audit Vault and Database Firewall	Rdb Products
Berkeley DB	R Distribution
Big Data Connectors	Secure Backup
Cluster Verification Utility	Secure Backup Cloud Module for Amazon S3
Database Mobile Server	TimesTen In-Memory Database

19.3

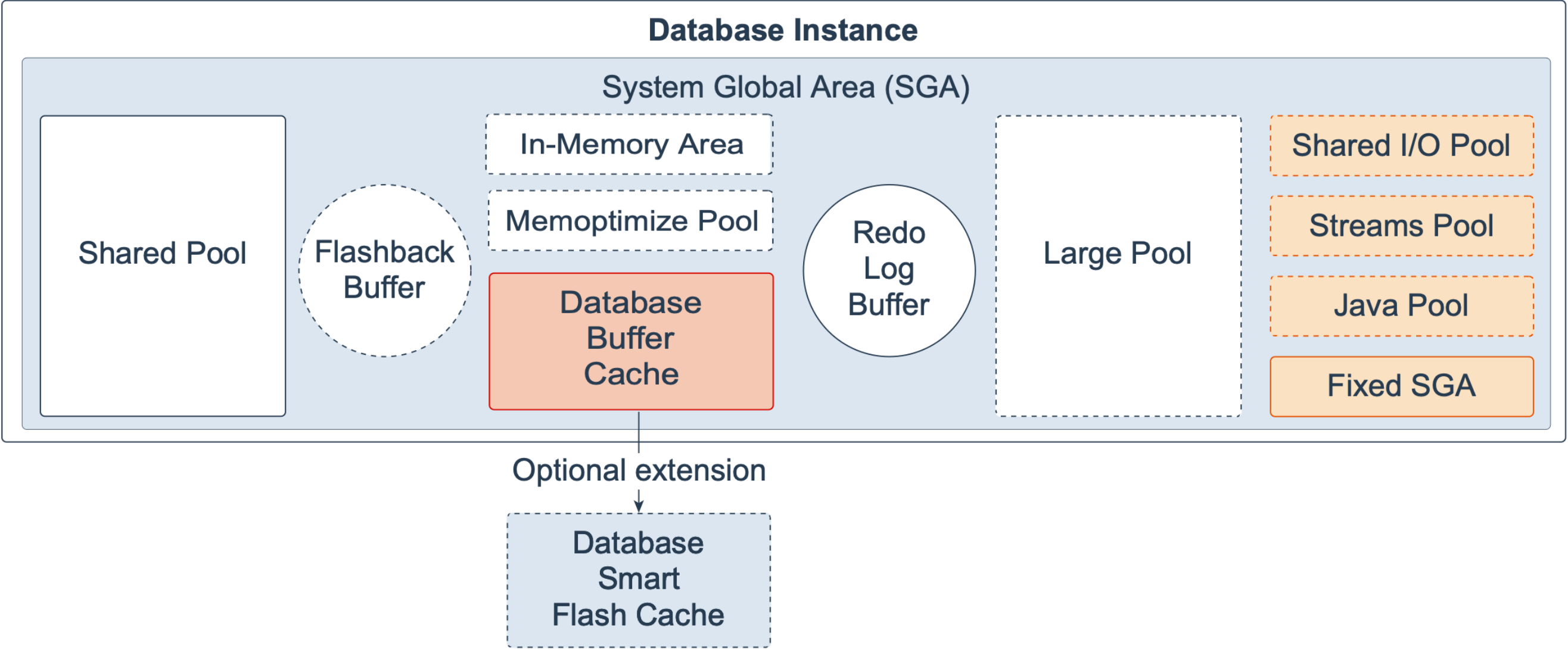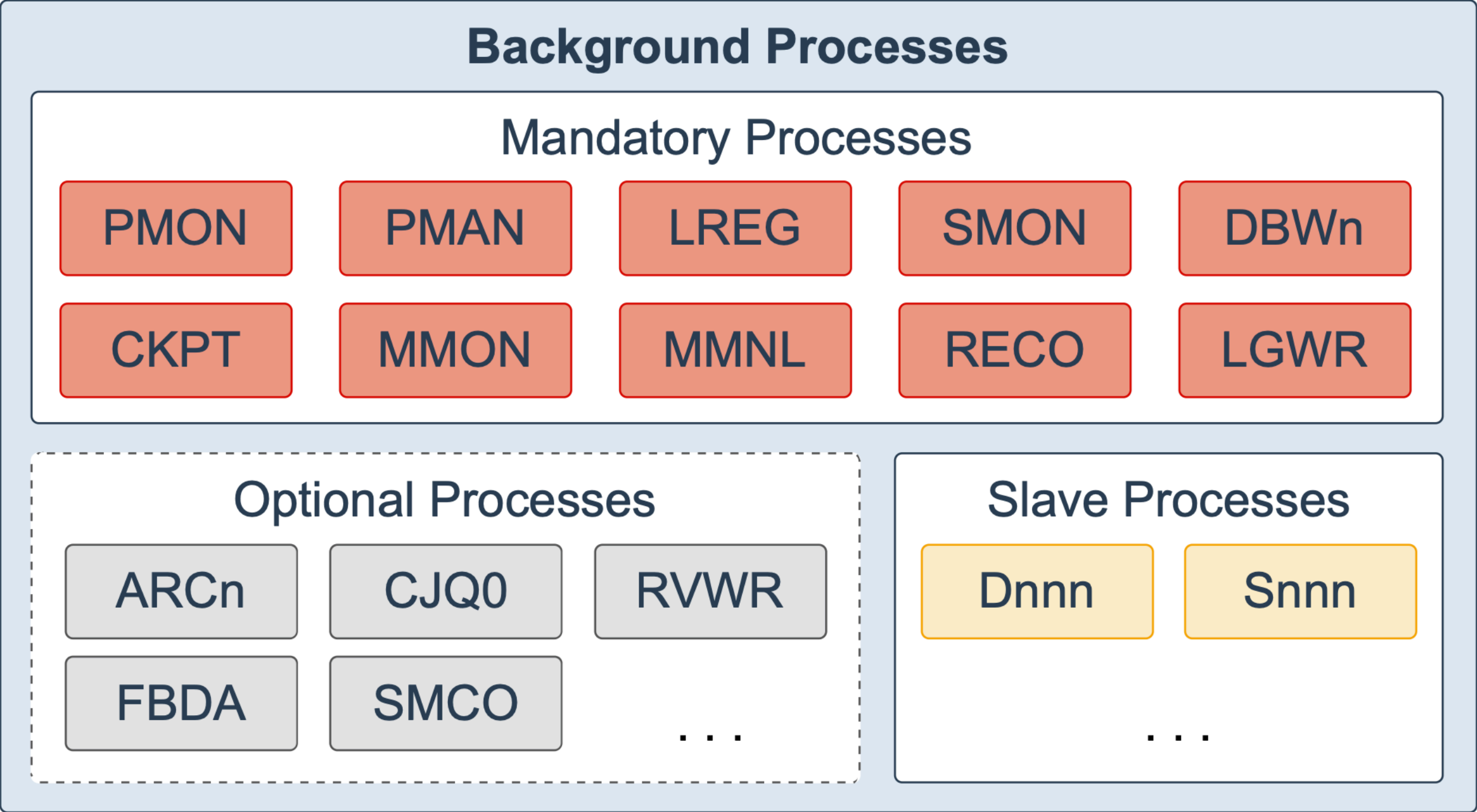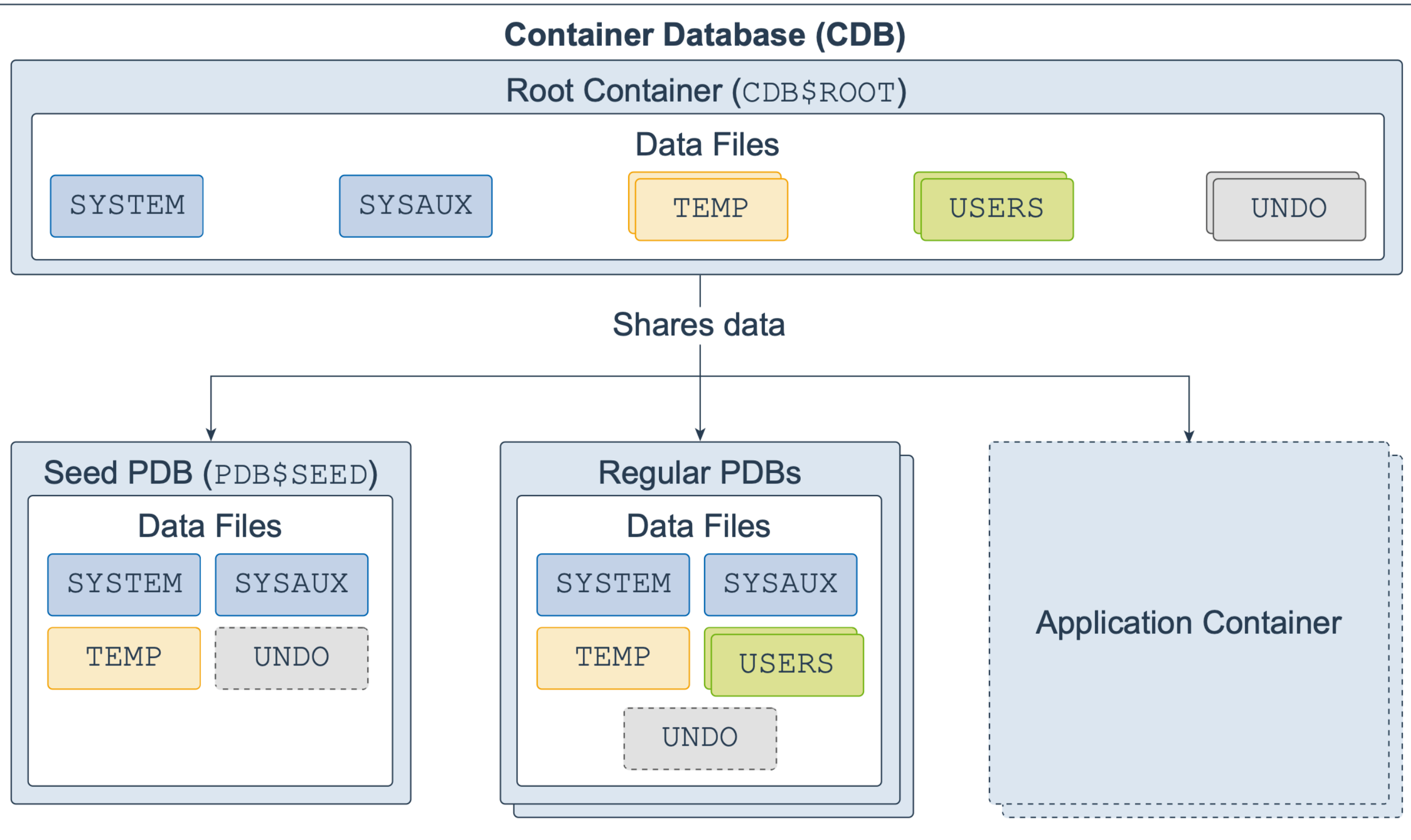| Name |
| --- |
| Microsoft Windows x64 (64-bit) |
| Linux x86-64 |
| Oracle Solaris (SPARC systems, 64-bit) |
| IBM AIX |
| HP-UX ia64 |
| Linux on System z (64-bit) |

Database Server

Database instance

System Global Area

Database Instance

System Global Area (SGA)

Shared Pool	Flashback Buffer	In-Memory Area	Redo Log Buffer	Large Pool	Shared I/O Pool
		Memoptimize Pool			Streams Pool
		Database Buffer Cache			Java Pool
					Fixed SGA

Optional extension

Database Smart Flash Cache

Background Processes

Background Processes

Mandatory Processes

PMON	PMAN	LREG	SMON	DBWn
CKPT	MMON	MMNL	RECO	LGWR

Optional Processes

ARCn	CJQ0	RVWR
FBDA	SMCO	. . .

Slave Processes

Dnnn	Snnn
. . .	

Database data files

Container Database (CDB)

Root Container (CDB$ROOT)

Data Files

SYSTEM | SYSAUX | TEMP | USERS | UNDO

Shares data

Seed PDB (PDB$SEED)

Data Files

SYSTEM | SYSAUX
TEMP | UNDO

Regular PDBs

Data Files

SYSTEM | SYSAUX
TEMP | USERS
UNDO

Application Container

Database system files

Database System Files

Required Files for Startup
- Control Files
- Parameter File
- Online Redo Log Files

Automatic Diagnostic Repository (ADR)

Backup Files

Archive Redo Log Files

Password File

Wallets

Block Change Tracking File

Flashback Logs

RDBMS

- Relational Database Management System

  - MySQL, MS SQL Sever, Oracle SyBase, Informix, Access

- OORDBMS (Object-Oriented Database)

你可以練習使用什麼資料庫？

- https://www.makeuseof.com/tag/5-easy-use-free-alternatives-microsoft-access/

- Oracle database express

資料庫系統的處理架構

- 單機

- Mainframe

- Client/Server

- Internet/ Cloud

資料庫的邏輯結構

- Tablespace

- Datafile (非邏輯結構)

- Segment

- Extent

- Blocks

資料庫 DBA

- A small site can have one <u>database administrator</u> who administers the database for <u>application developers</u> and <u>users</u>.

Database Administrators

- Each database requires at lease one database administrator (DBA).

- Database administration is sometimes not a one-person job, but a job for a group of DBAs

DBA 的責任

- Installing and upgrading the Oracle Database server and application tools.

- Allocating system storage and planning future storage requirements for the database system.

- Creating primary database storage structures (tablespaces) after application developers have designed an application.

Network Administrators

- Some sites have one or more network administrators.

- A network administrator administers Oracle networking products, such as Oracle Net Services.

Others Database Roles

- Application Developers

- Application Administrators

- Database Users

Submitting Commands and SQL to the Database

- SQL, Structure Query Language

- Command line interface of SQL*Plus

- Oracle Enterprise Manager

- SQL Developer

Connecting to Database with SQL

- Telnet

- Client 軟體

- ODBC

Basic SQL Commands

- The SQL SHOW statement displays information contained in the database and its tables. This helpful tool lets you keep track of your database contents and remind yourself about the structure of your tables.

- For example, the ***SHOW DATABASES*** command lists the databases managed by the server.

- The ***SHOW TABLES*** command is used to display all of the tables in the currently selected MySQL database.

實作

- 使用你自己的 RDBMS，如果沒有請參考下列網路免費資源。
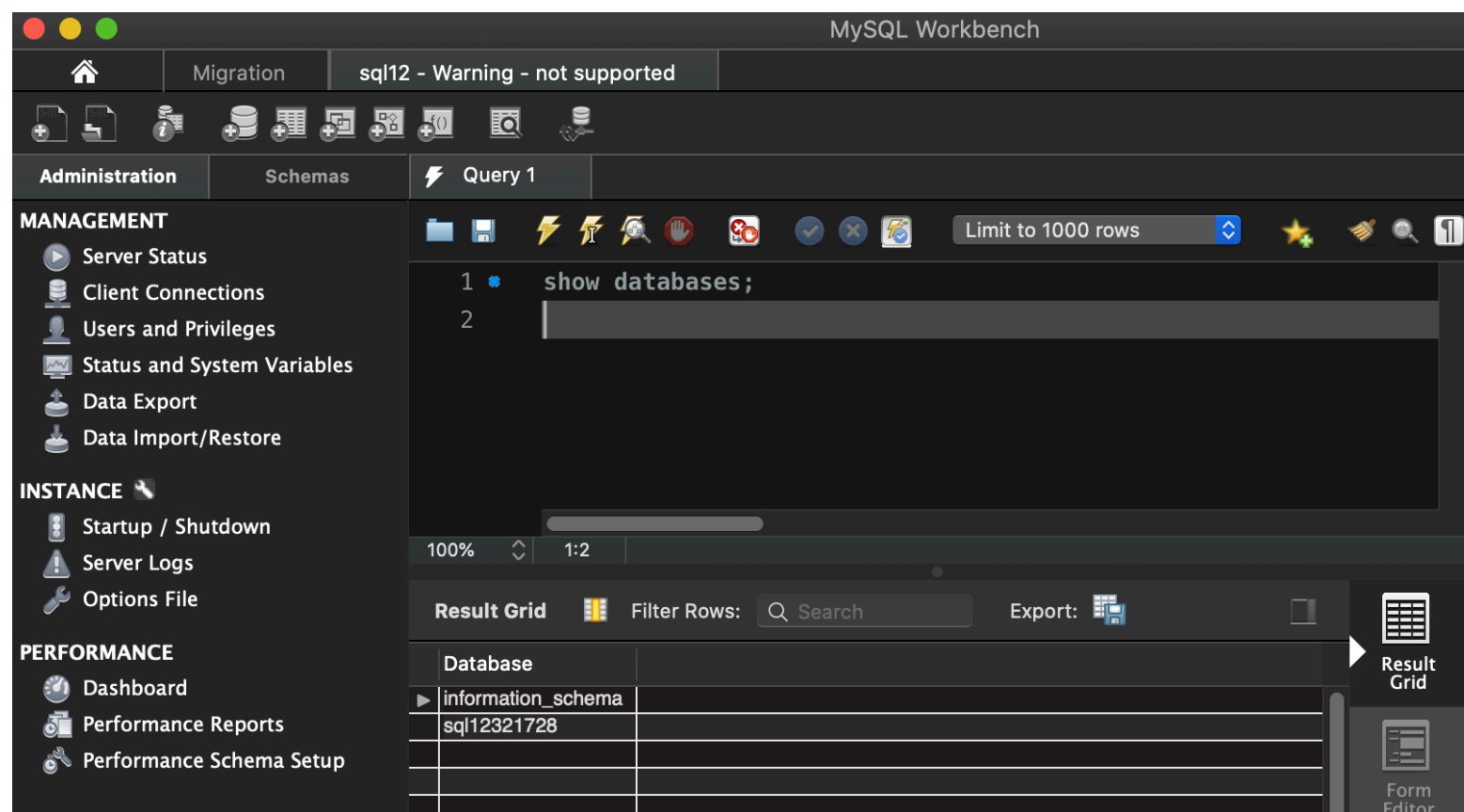
```
1  use sql12321728;
2  show databases;
3  show tables;
```

- SHOW COLUMNS displays information about the columns in a given table.

```
SHOW COLUMNS FROM customers
```

- The following example displays the columns in our customers table:SHOW COLUMNS display
  table column:

Field	Type	Null	Key	Default	Extra
ID	int(11)	NO	PRI	NULL	
FirstName	varchar(60)	NO		NULL	
LastName	varchar(60)	NO		NULL	
City	varchar(30)	NO		NULL	
ZipCode	int(10)	NO		NULL	

- **Field**: column name
  Type: column data type
  Key: indicates whether the column is indexed
  Default: default value assigned to the column
  Extra: may contain any additional information that is available about a given column

```
1    use sql12321728;
2    CREATE table customers (
3        ID int(11), FirstName varchar(60), LastName varchar(60),
4        City varchar(30), ZipCode int(10));
```

- Choose the options below to complete the command to list all of the databases.

  ☐☐☐☐, ☐☐☐☐,

  SQL   DATABASES   SELECT   GO   SHOW

- Choose the options below to view a list of tables for the currently selected database.

  SHOW ☐☐☐☐,

  THIS   DATA   COLUMNS   TABLES

- Choose from the options below to view the columns from the 'customers' table:

_____ COLUMNS
_____ customers

DISPLAY   SHOW   FROM   VIEW   TABLE

SELECT Statement

- The SELECT statement is used to select data from a database.

  ```
  SELECT column_list
  FROM table_name
  ```

- The result is stored in a result table, which is called the result-set.

  - **column_list** includes one or more columns from which data is retrieved
  - **table-name** is the name of the table from which the information is retrieved

- A query may retrieve information from selected columns or from all columns in the table.

- To create a simple SELECT statement, specify the name(s) of the column(s) you need from the table.

- Syntax of the SQL SELECT Statement:

- Below is the data from our customers table:

ID	FirstName	LastName	City	ZipCode
1	John	Smith	New York	10199
2	David	Williams	Los Angeles	90052
3	Chloe	Anderson	Chicago	60607
4	Emily	Adams	Houston	77201
5	James	Roberts	Philadelphia	19104

The following SQL statement selects the FirstName from the customers table:

```
SELECT FirstName FROM customers
```

- Compose the code to select the ''name'' column values from the ''customers'' table.

| FROM |
| customers |
| name |
| SELECT |

SQL Syntax Rules

Multiple Queries

```
SELECT FirstName FROM customers;
SELECT City FROM customers;
```

- SQL allows to run multiple queries or commands at the same time.

- The following SQL statement selects the FirstName and City columns from the customers table:

Remember to end each SQL statement with a **semicolon** to indicate that the statement is complete and ready to be interpreted.
In this tutorial, we will use **semicolon** at the end of each SQL statement.

Case Sensitivity

```
select City from customers;
SELECT City FROM customers;
sElEct City From customers;
```

- SQL is case insensitive.

- The following statements are equivalent and will produce the same result:

It is common practice to write all SQL commands in **upper-case**.

Syntax Rules

```
SELECT     City


FROM customers;
```

- A single SQL statement can be placed on one or more text lines. In addition, multiple SQL statements can be combined on a single text line.

- White spaces and multiple lines are ignored in SQL.

- For example, the following query is absolutely correct.

Combined with proper spacing and indenting, breaking up the commands into logical lines will make your SQL statements much easier to read and maintain.

Selecting Multiple Columns

```
SELECT FirstName, LastName, City
FROM customers;
```

- As previously mentioned, the SQL SELECT statement retrieves records from tables in your SQL database.

- You can select multiple table columns at once.

- Just list the column names, separated by commas:

Do not put a comma after the **last** column name.

Selecting All Columns

- To retrieve all of the information contained in your table, place an asterisk (*) sign after the SELECT command, rather than typing in each column names separately.

- The following SQL statement selects all of the columns in the customers table:

```
SELECT * FROM customers;
```

Quiz

- SQL 語法中的空白與分行會對執行結果產生什麼作用？

- Fill in the blanks to select name and city from the "people" table.

  SELECT _____ , city FROM _____ ;