



DBA
ORACLE

ORACLE

COURS DBA ORACLE

BY IDEO-LAB 2026

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REVISION 3.45



IDEO·LAB

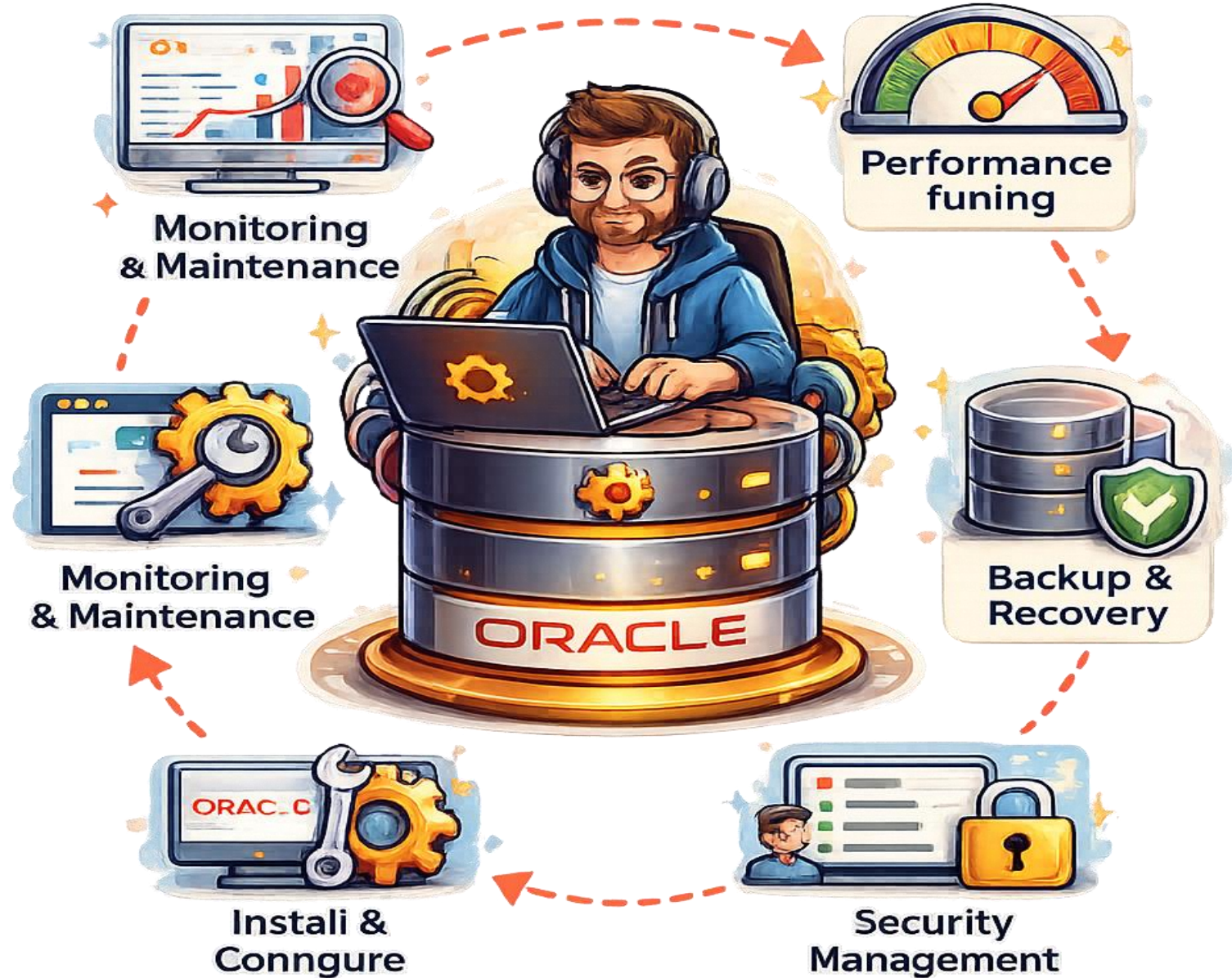
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TUNING
ORACLE

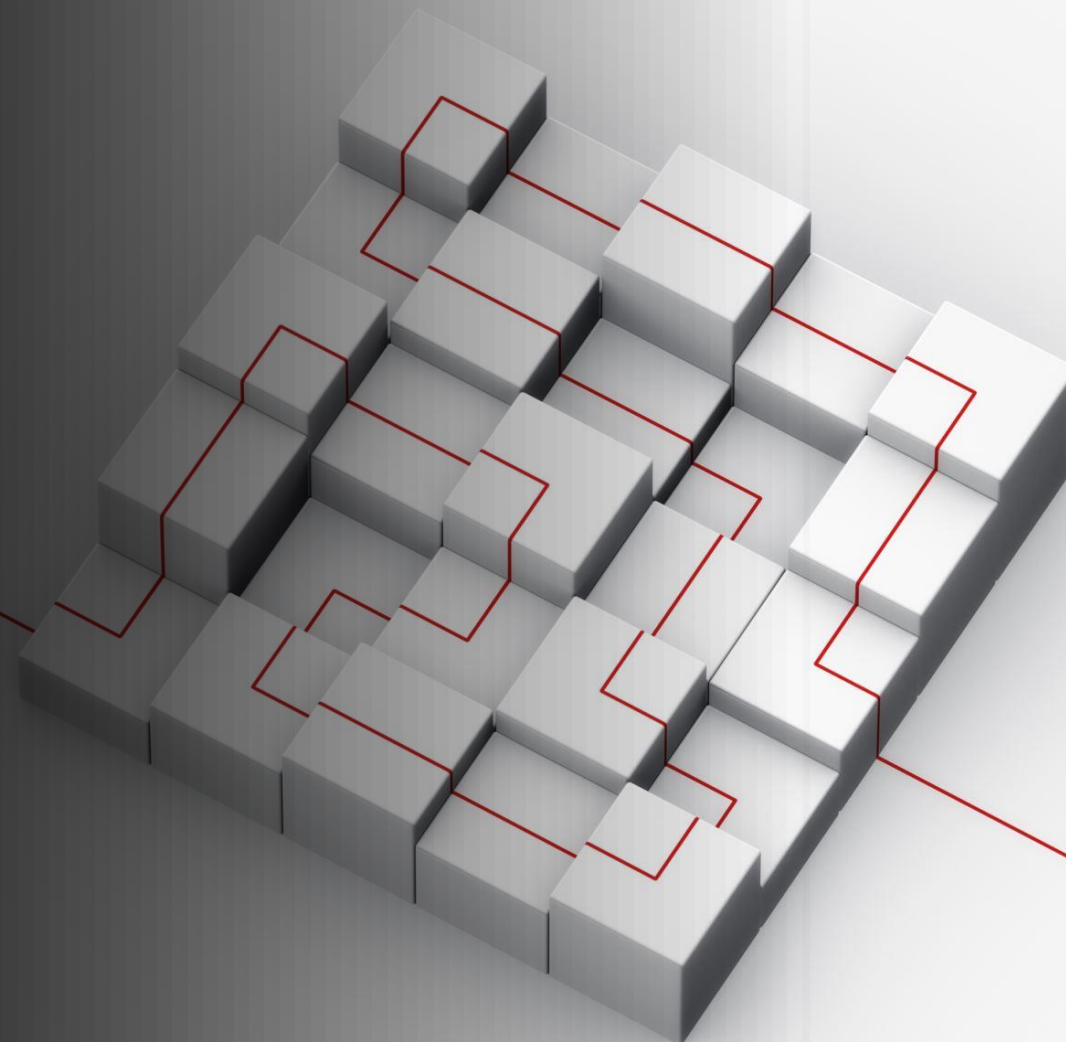
LE METIER DE DBA

DBA





ORACLE et L'IA EN PREAMBULE



L'IA Toute le monde en Parle en 2026 !!



L'IA NE REMPLACE PAS LE DBA... ELLE CHANGE SON RÔLE

Avant :

Le DBA passait énormément de temps à

- 🔧 surveiller
- 🔧 diagnostiquer
- 🔧 optimiser à la main

Aujourd'hui :

L'IA prend en charge une partie du "travail mécanique", et le DBA devient un pilote stratégique.

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Avant



Le DBA passait énormément de temps à



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optimiser
à la main



Aujourd'hui



L'IA prend en charge une partie du "travail mécanique"



et le DBA devient
un pilote stratégique

L'IA ne supprime pas le DBA, elle le fait monter en gamme.

LE DBA DEVIENT UN "CHEF D'ORCHESTRE

🎯 Nouveau rôle clé

Superviser, valider et cadrer les décisions prises par l'IA

Ce que le DBA fait désormais

- Interpréter les recommandations IA
 - Tous les index proposés ne sont pas bons
 - L'IA ne voit pas toujours l'impact global (batch, ETL, rapports...)
 - Éviter les effets de bord
 - Une optimisation IA peut dégrader un autre workload
 - Le DBA garde la vision système globale
 - Paramétrer les moteurs autonomes
 - Définir les seuils d'auto-tuning
 - Encadrer ce que l'IA a le droit de modifier
 - Garder le contrôle humain
- 👉 Le DBA devient le garant de la cohérence, pas juste l'exécutant.

🎯 Nouveau rôle clé

Superviser, valider et cadrer les décisions prises par l'IA



LE DBA DEVIENT UN “CHEF D'ORCHESTRE IA”

Avant



Aujourd'hui



✓ Interpréter les recommandations IA

- Tous les index proposés ne sont pas bons
- L'IA ne voit pas toujours l'impact global

⚙️ Paramétrer les moteurs autonomes

- Définir les seuils d'auto-tuning
- Encadrer ce que l'IA peut modifier
- Garder le contrôle humain

Le DBA supervise et contrôle les **décisions prises** par l'IA

⚠️ Éviter les effets de bord

Le DBA garde la vision système globale

Il devient le **garant de la cohérence** dans un **système intelligent**

⚙️ Paramétrer les moteurs autonomes

- Définir les seuils d'auto-tuning

Le DBA moderne doit comprendre les bases de l'IA appliquée aux bases de données.

LES NOUVELLES COMPÉTENCES DU DBA EN 2026

Compétences qui montent en valeur

Compétence	Pourquoi c'est important
Analyse d'anomalies	Comprendre les alertes IA
Data observability	Lire les métriques intelligentes
Automatisation	Travailler avec des systèmes autonomes
Cloud DB autonomes	Oracle Autonomous, AlloyDB, Aurora AI
Scripting + IA	Utiliser IA pour analyser logs, plans SQL

Le DBA ne fait plus seulement du SQL tuning, il fait du :

Supervised AI Database Operations

LES NOUVELLES COMPÉTENCES DU DBA EN 2026

Le DBA doit comprendre les bases de l'IA appliquée aux bases de données



Certaines choses restent 100% humaines :

CE QUE L'IA NE REMPLOCERA PAS

🧠 Compréhension métier

L'IA ne sait pas :

- qu'une requête lente est critique car elle touche la facturation
- qu'un batch peut être décalé
- que telle appli est prioritaire pour le business

⚠️ Gestion de crise

En cas d'incident majeur :

- Décision rapide
- Arbitrage
- Communication
- Priorisation

👉 L'IA aide au diagnostic

👉 Le DBA prend les décisions

CE QUE L'IA NE REMPLACERA PAS...

Compréhension métier

Gestion de crise



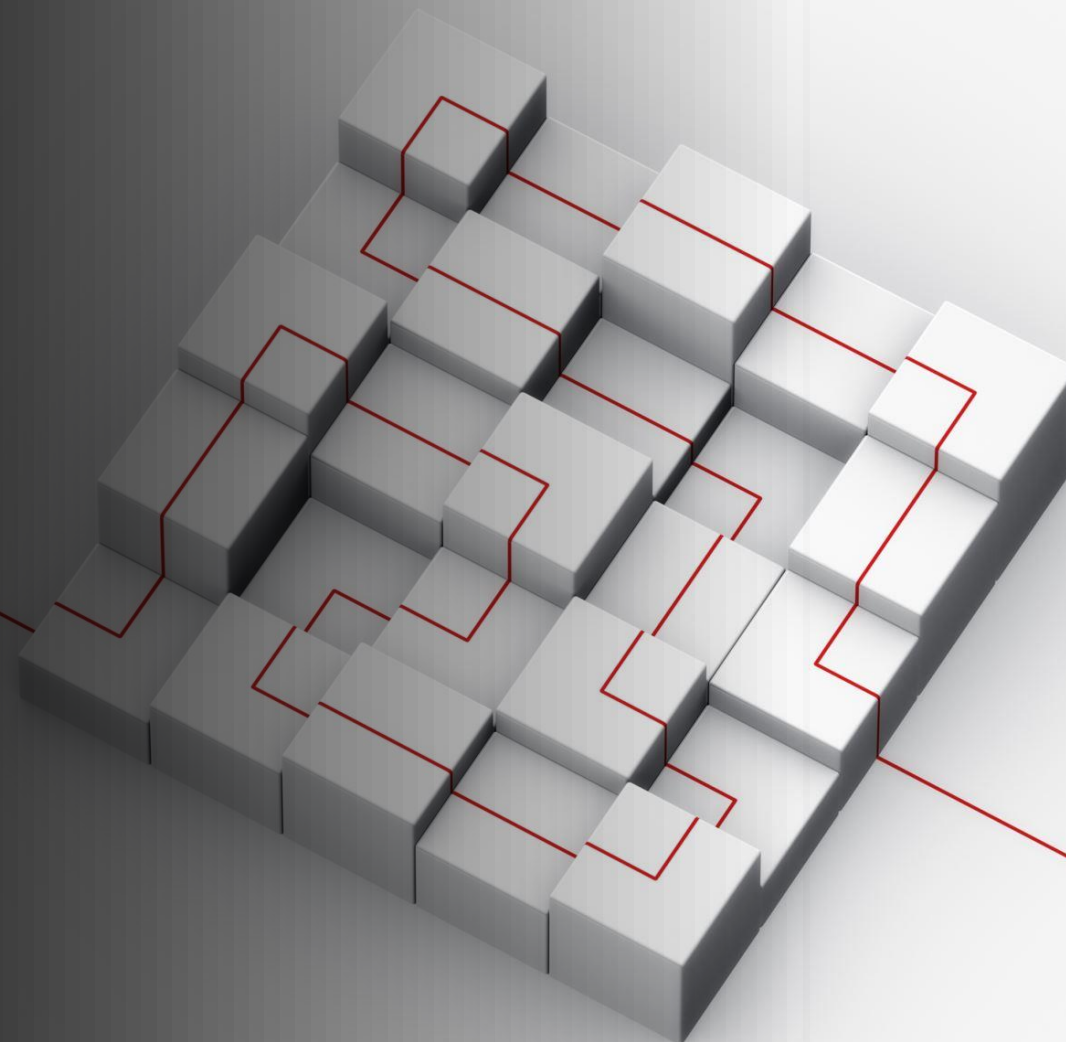
- ✓ Qu'une requête lente est critique car elle touche la facturation
- ✓ Qu'un batch peut être décalé
- ✓ que telle appli est prioritaire pour le business

- ◆ Décision rapide
- ◆ Arbitrage
- ◆ Communication
- ◆ Priorisation

Certaines tâches restent 100% humaines



ORACLE : UN PEU D'HISTOIRE



ORACLE : UN PEU D'HISTOIRE

- Les origines d'Oracle (années 1970)
- Pourquoi le nom "Oracle" ?
- L'évolution des premières versions
- Oracle 7 : le vrai décollage (1992)
- Oracle 8 & 8i : l'ère Internet
- Oracle 9i / 10g : haute dispo et grid
- Oracle 11g : performance et diagnostic
- Oracle 12c : le cloud et le multitenant
- Oracle 18c, 19c, 21c : stabilité + autonomie
- Oracle face à la concurrence



en 1977 en Californie. L'idée fondatrice vient d'un article IBM de System R, première implémentation du modèle relationnel d'Ed

Détail

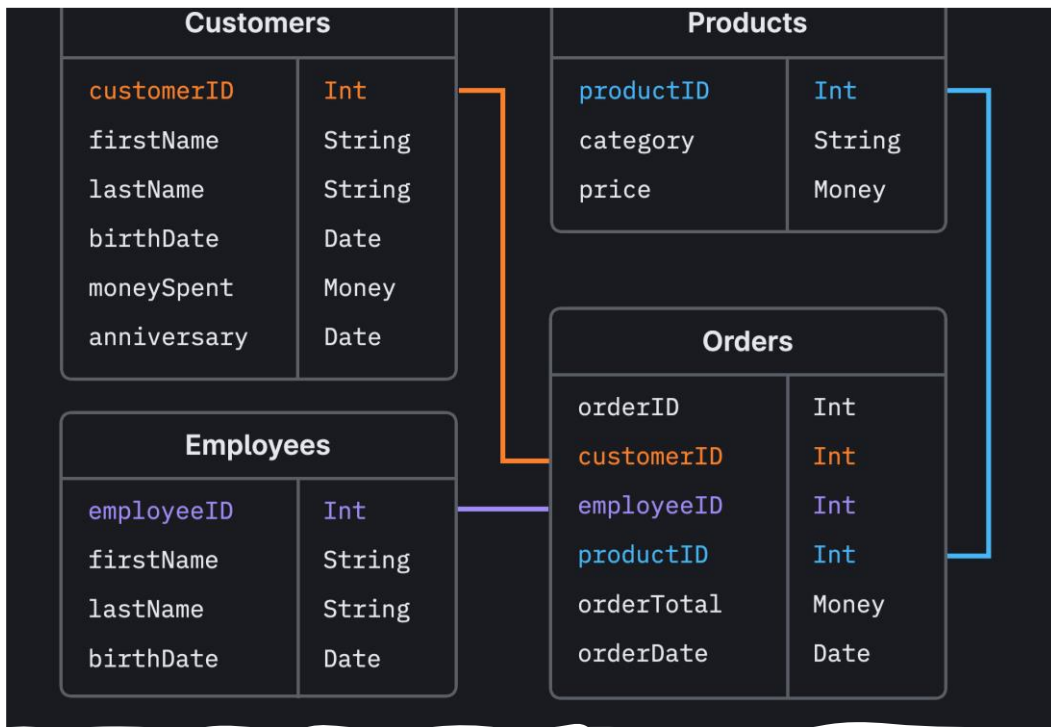
Software Development Laboratories

Larry Ellison, Bob Miner, Ed Oates

1er SGBD relationnel commercial SQL

Défense, gouvernement, grandes entreprises

Naissance d'Oracle Corporation (1977–1979)



Avant Oracle, les bases étaient hiérarchiques ou réseau.

Modèle	Limite
Hiérarchique	Rigidité structure
Réseau	Complexité navigation
Relationnel (Oracle)	Requêtes flexibles via SQL

SQL devient un standard mondial, propulsé par Oracle.

L'adoption du modèle relationnel



Oracle mise sur Unix + portabilité multi-plateforme.

Année	Avancée
1983	Portage multi-OS
1984	Transactions ACID
1985	Architecture client/serveur

Oracle devient la base privilégiée des systèmes d'entreprise critiques.

Croissance rapide dans les années 80



Oracle 7 transforme Oracle en **plateforme applicative complète**.

Fonction clé

Impact

PL/SQL

Logique métier en base

Triggers

Automatisation

Intégrité référentielle

Cohérence données

Sécurité avancée

Environnements bancaires

Oracle 7 : l'explosion entreprise (1992)



Oracle anticipe le boom web.

Innovation

Pourquoi c'est clé

Support XML

Web data

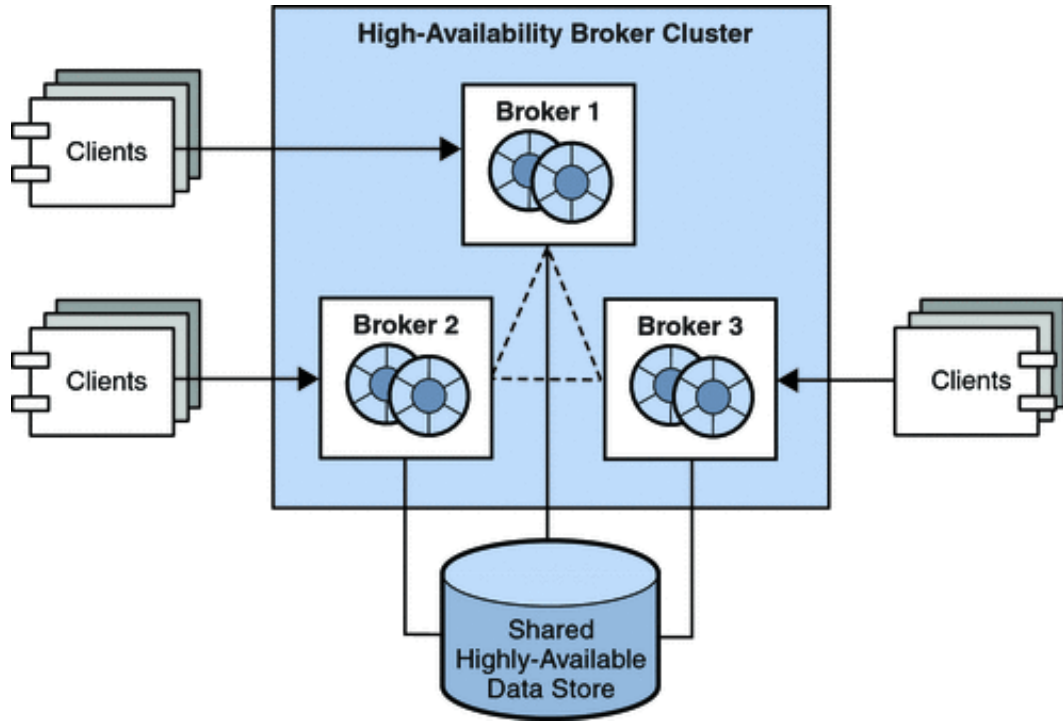
Java en base

Logique applicative

Partitionnement

Gros volumes

L'ère Internet : Oracle 8 / 8i

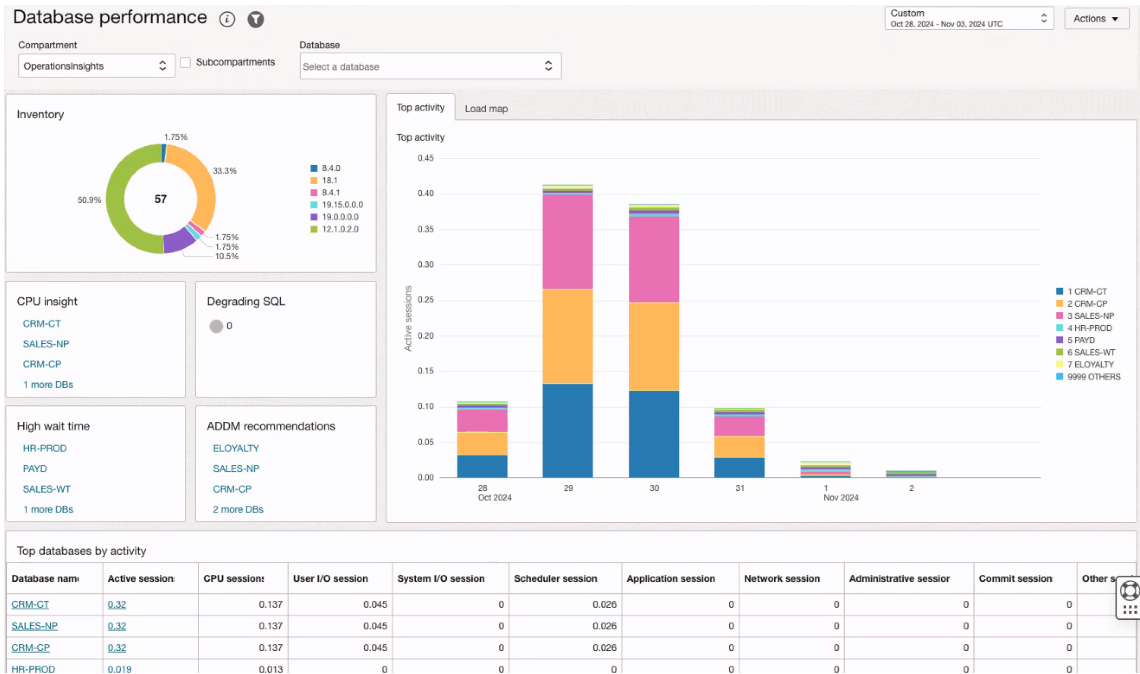


Technologie	Description
RAC	Cluster actif/actif
Data Guard	Réplication distante
Grid Computing	Mutualisation ressources

Oracle devient leader des systèmes 24/7 critiques.

Oracle 9i / 10g : haute dispo mondiale





Outil

Rôle

AWR

Historique performance

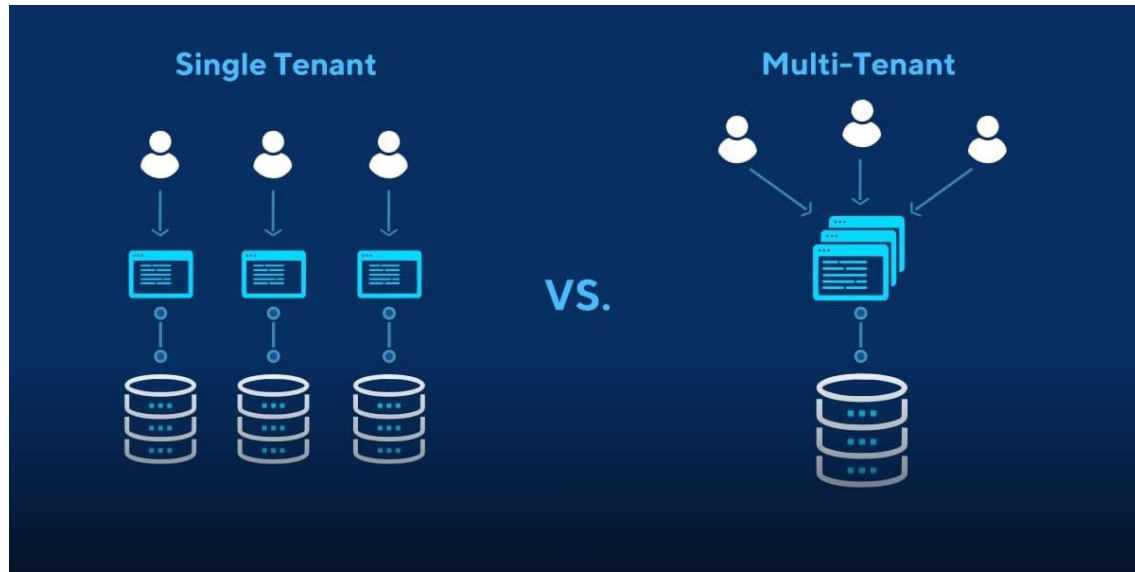
ASH

Sessions actives

ADDM

Diagnostic automatique

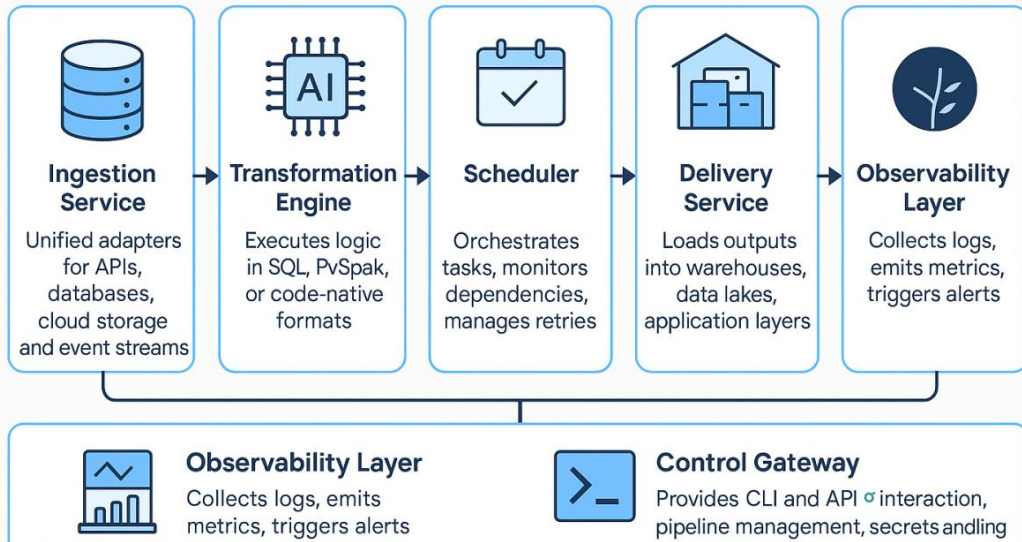
Oracle 11g : diagnostic automatique



Concept	Explication
CDB/PDB	Multi-tenant
DBaaS	Database as a Service
Consolidation	Moins de serveurs

Oracle 12c : révolution Cloud

MODULAR PLATFORM ARCHITECTURE



Version

Orientation

19c

Version LTS stable

21c

Base autonome

Focus

Auto-tuning, auto-patch

Oracle moderne (19c, 21c)

Global Graph Database Market

Share, by End-use, 2022 (%)



● Telecom & IT ● Healthcare ● BFSI ● Government
● Retail & e-commerce ● Energy & Utilities ● Automotive ● Others



\$2.6B

Global Market Size,
2022

Source:
www.grandviewresearch.com

Acteur

Positionnement

Microsoft SQL Server

Intégré Microsoft

IBM Db2

Mainframe historique

PostgreSQL Global Development Group

Open-source avancé

Amazon Web Services Aurora

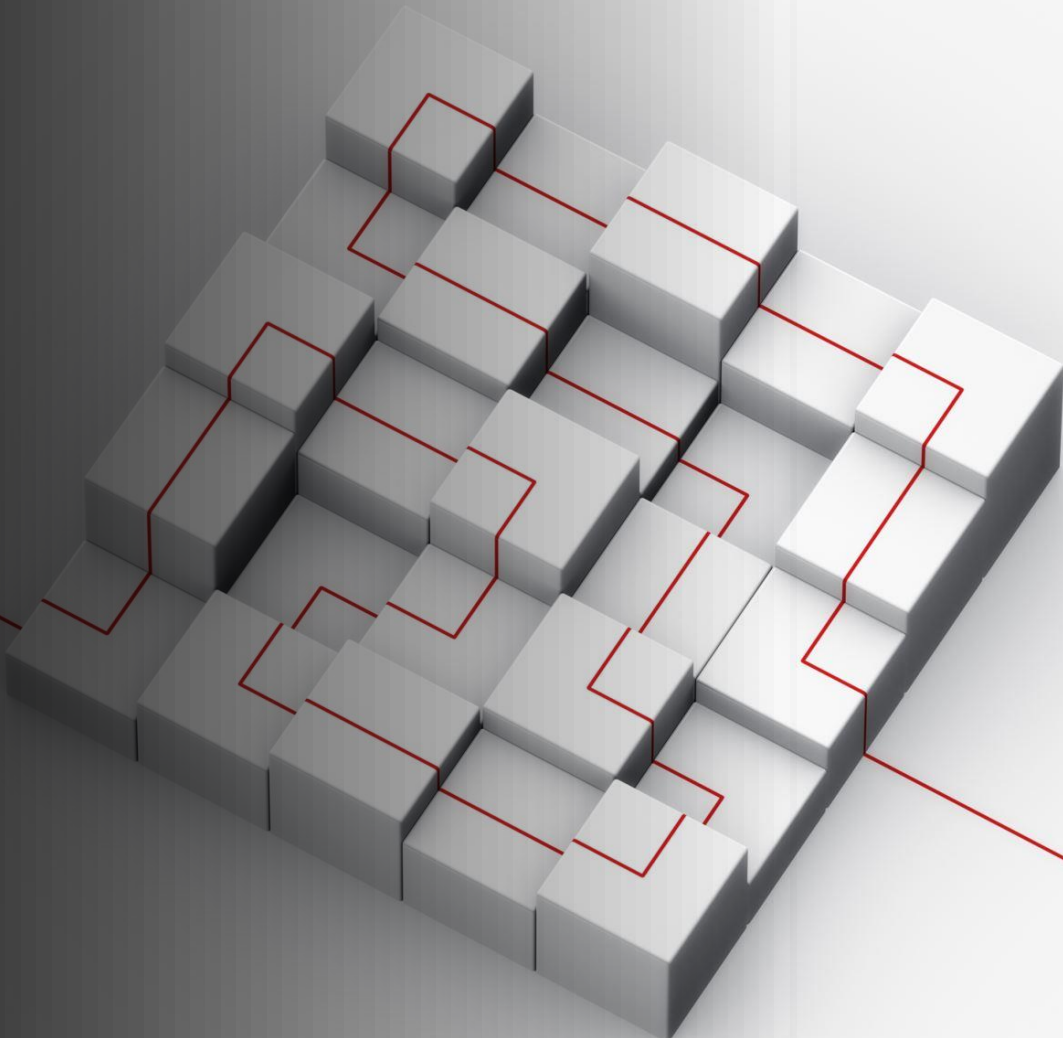
Cloud natif

Oracle reste la référence des environnements critiques à forte exigence de disponibilité.

Oracle face à la concurrence

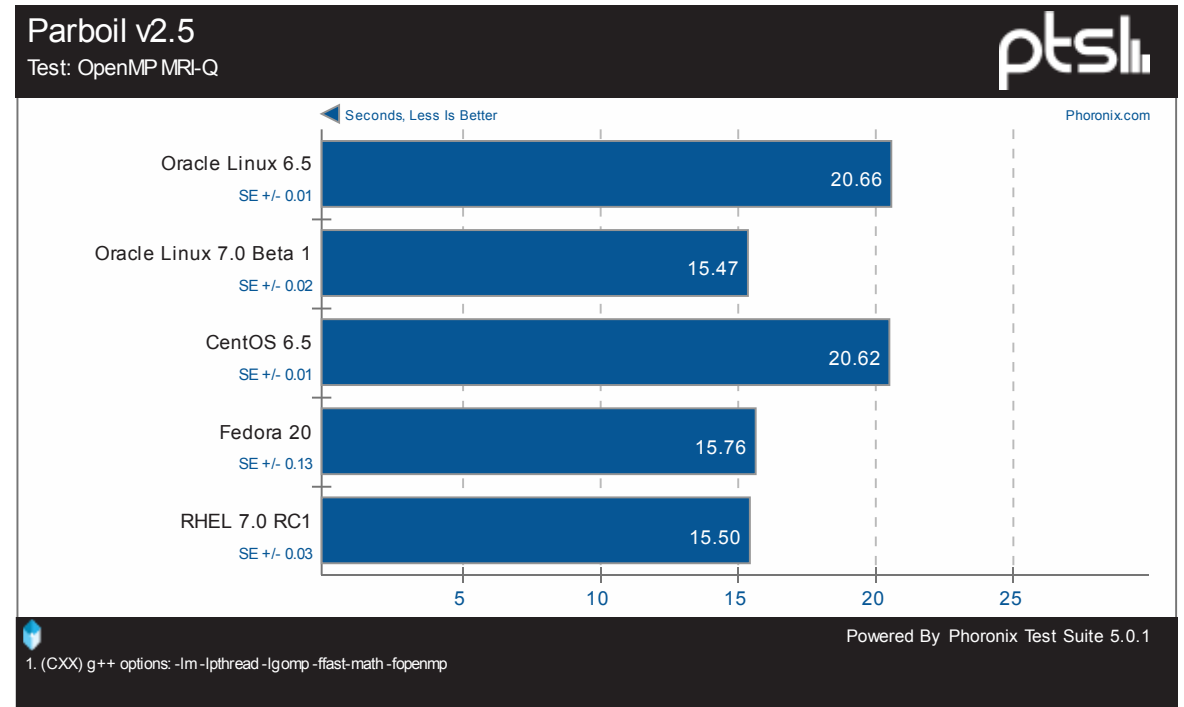


ECOSYSTEME ORACLE & REDHAT



“Une base Oracle stable commence par un OS parfaitement préparé.”

ÉCOSYSTÈME ORACLE & RED HAT ENTERPRISE LINUX

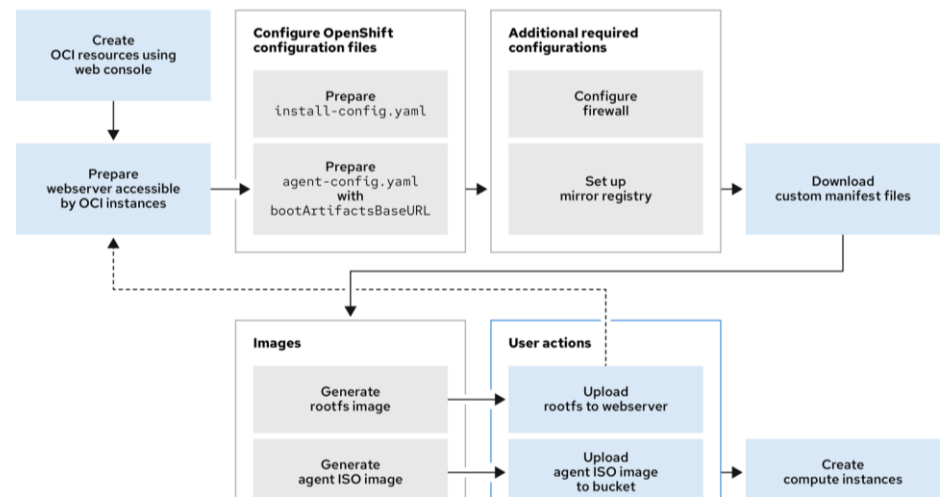


Pourquoi Red Hat est la référence pour Oracle

- **Red Hat Enterprise Linux est historiquement la plateforme la plus utilisée pour Oracle en entreprise.**

Raisons principales

Critère	Pourquoi Red Hat
Stabilité	Kernel éprouvé
Support	Long terme (10+ ans)
Certification	Oracle certifie RHEL
Sécurité	SELinux, patching




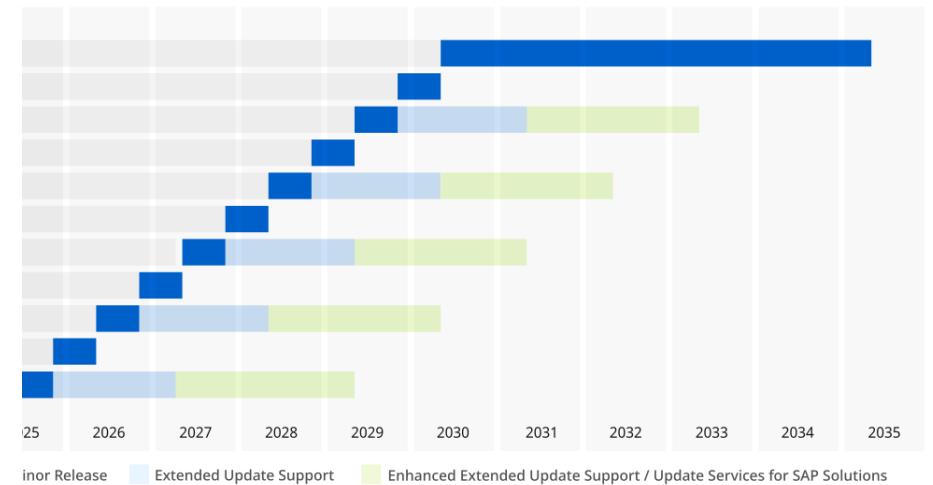
“Je ne mets jamais Oracle sur un OS non certifié, même si ‘ça marche’.”

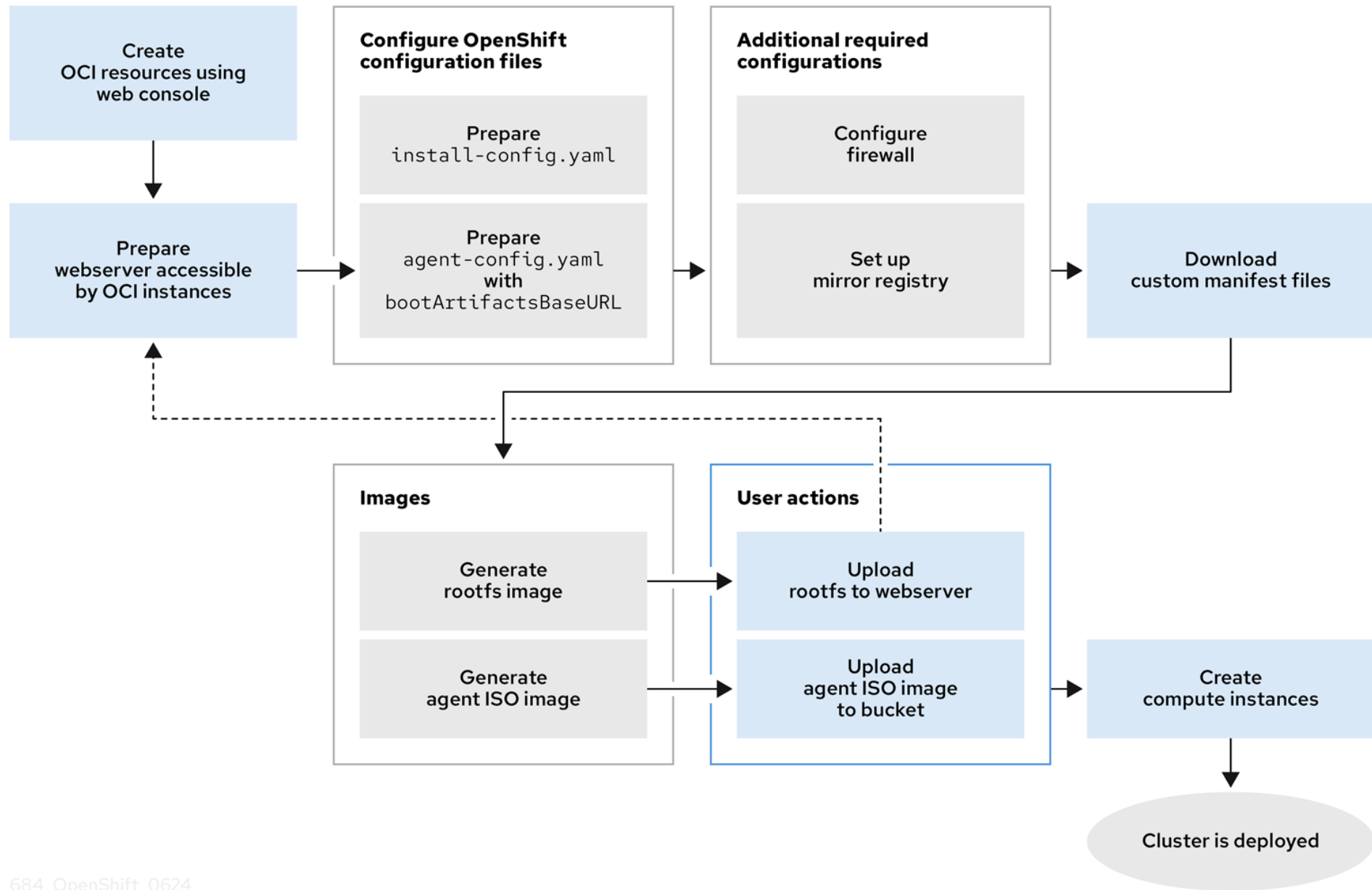
Choix de la version Red Hat

Bonnes pratiques

Oracle DB	RHEL recommandé
12c	RHEL 7
19c (LTS)	RHEL 7 / 8
21c	RHEL 8
23ai	RHEL 8 / 9

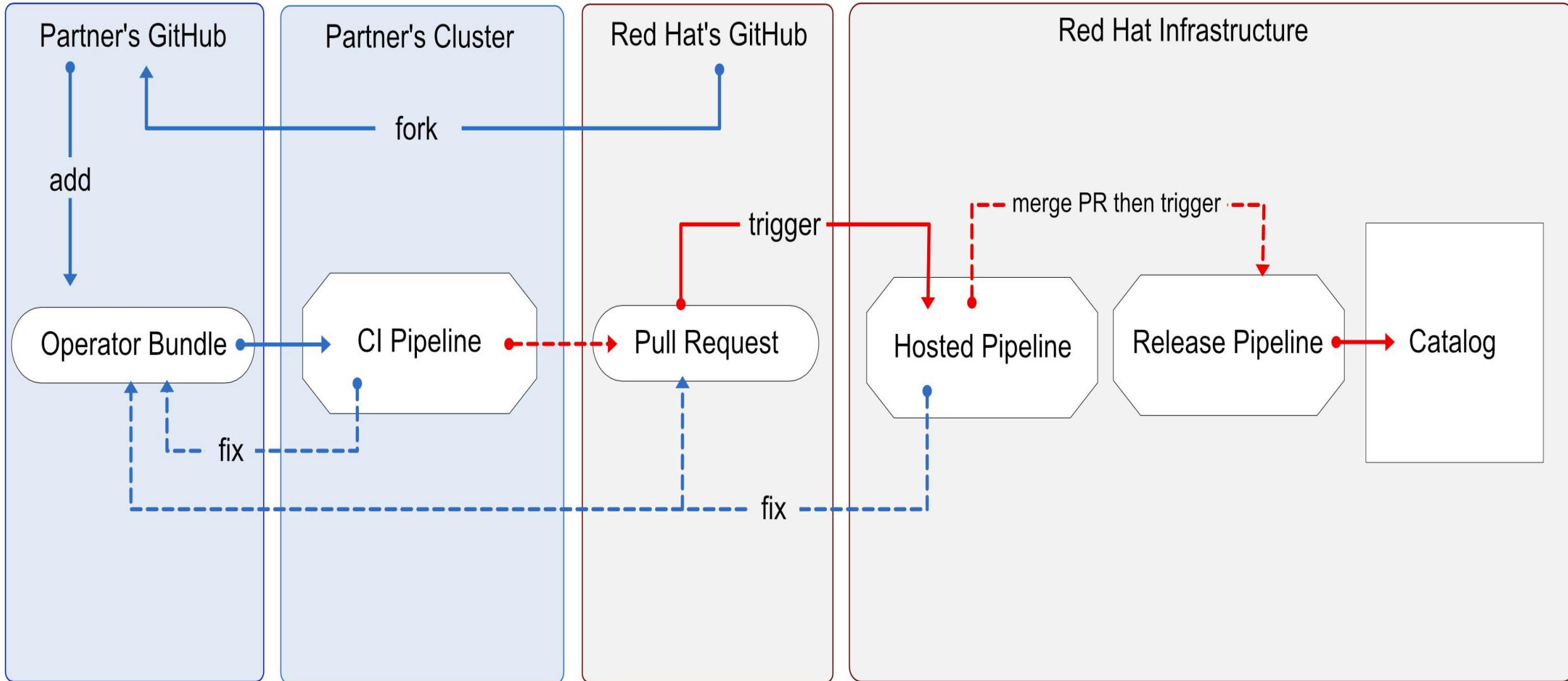
 Toujours vérifier la matrice de certification Oracle

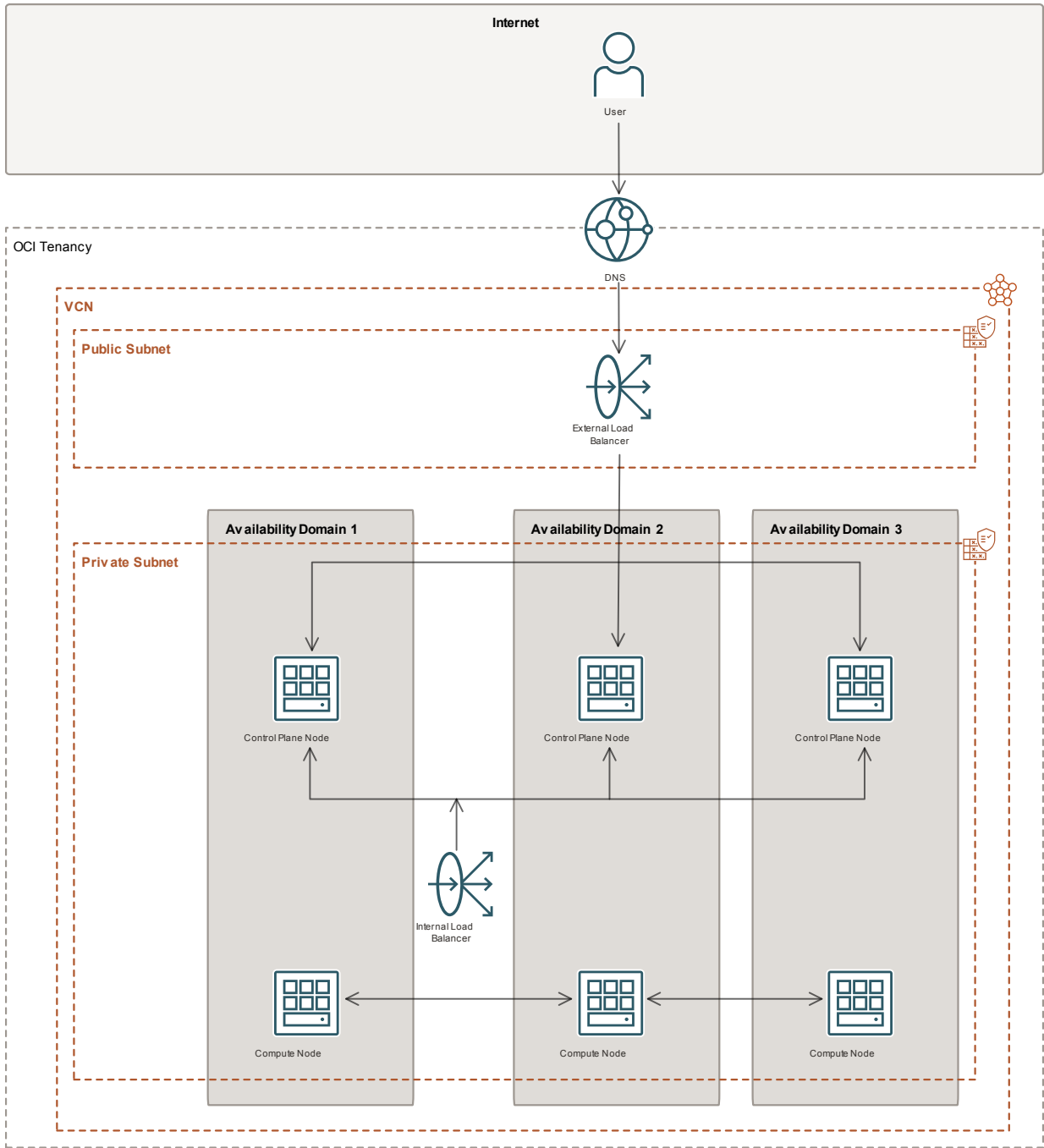




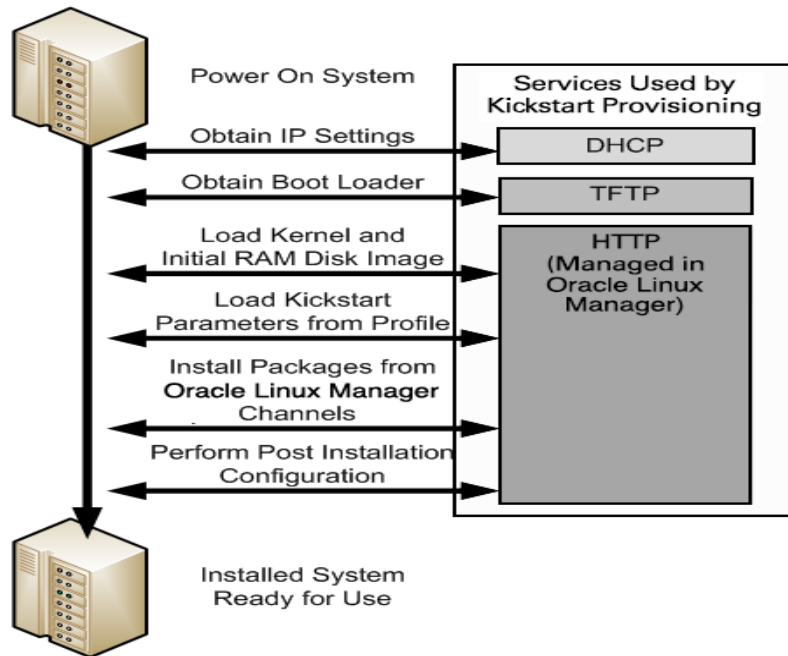
On Partner Premise

Red Hat Environment





Pré-requis système indispensables



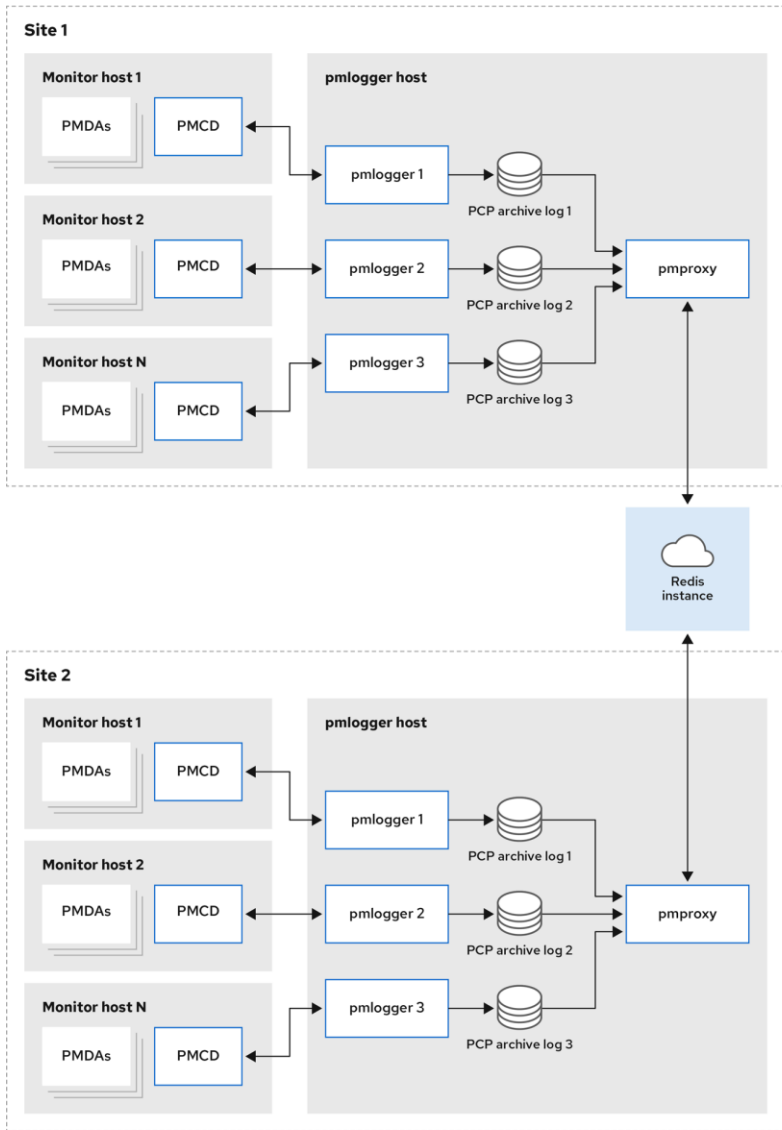
- **“90% des installations instables viennent d’un OS mal préparé.”**

Packages & OS

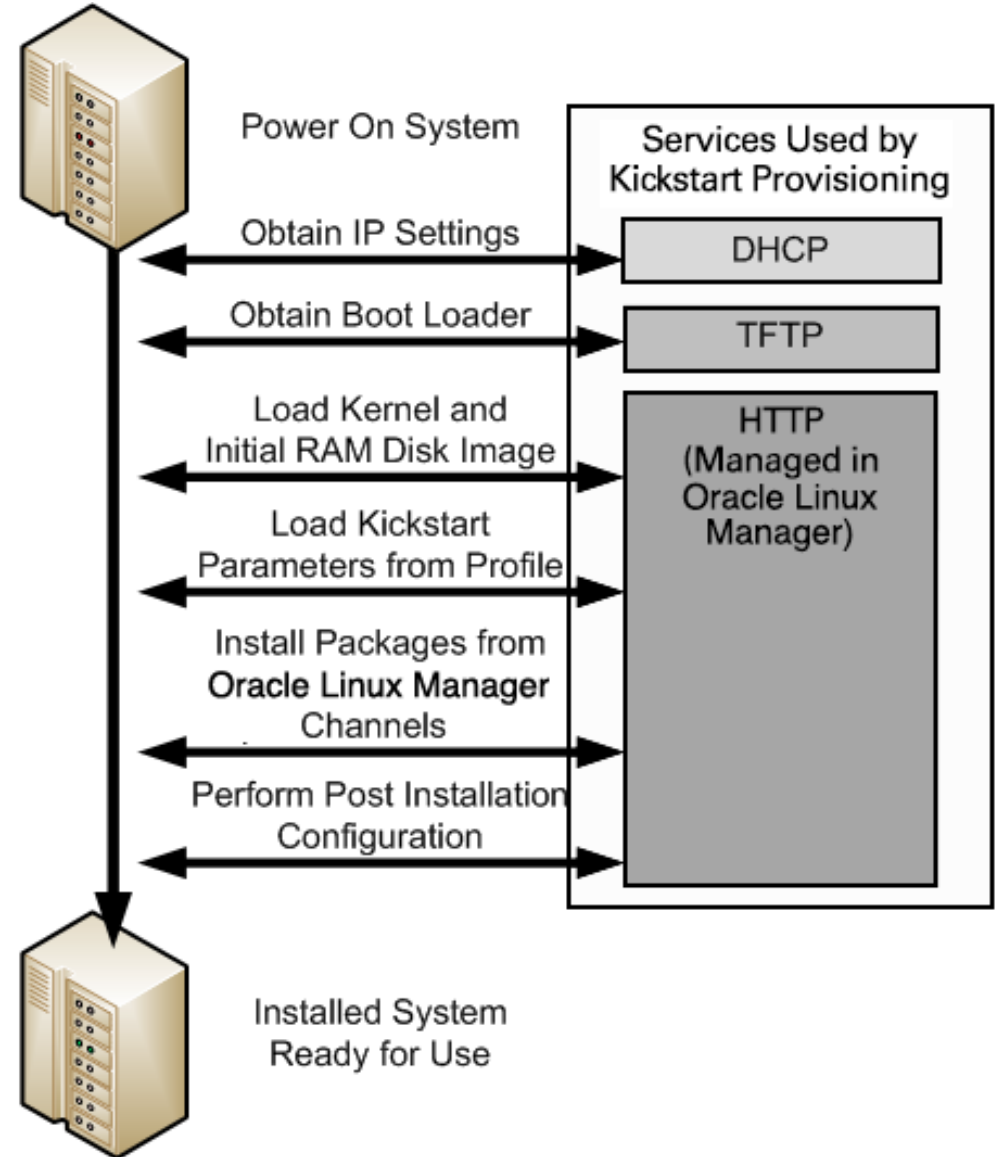
- gcc, glibc, libaio
- compat-libcap
- binutils
- ksh

Paramètres kernel critiques (`sysctl`)

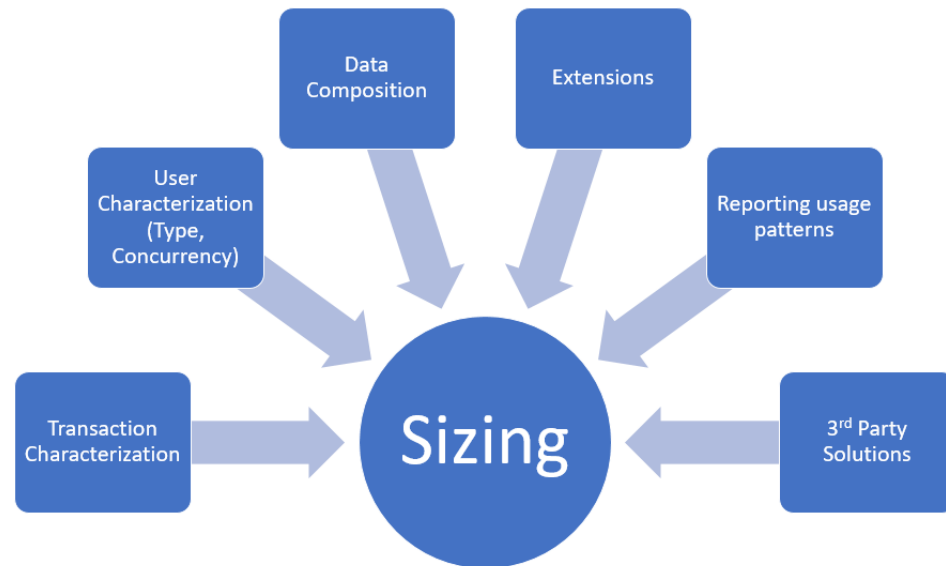
Paramètre	Rôle
shmmax	Mémoire partagée
shmmni	Segments
sem	Sémaphores
fs.aio-max-nr	I/O asynchrones



173_RHEL_0721



CPU / vCPU — Comprendre les besoins réels



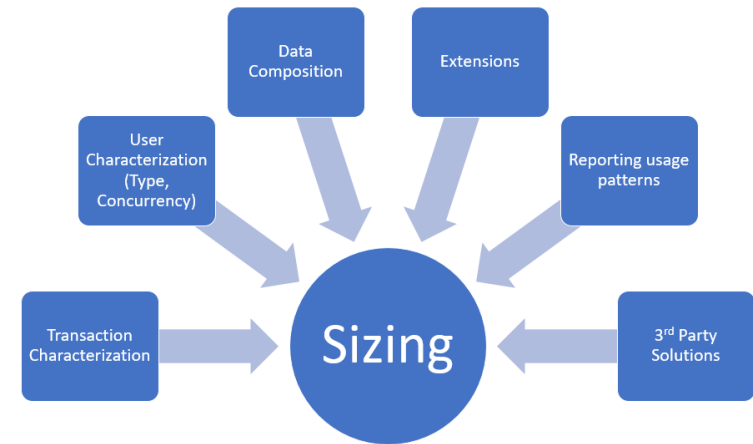
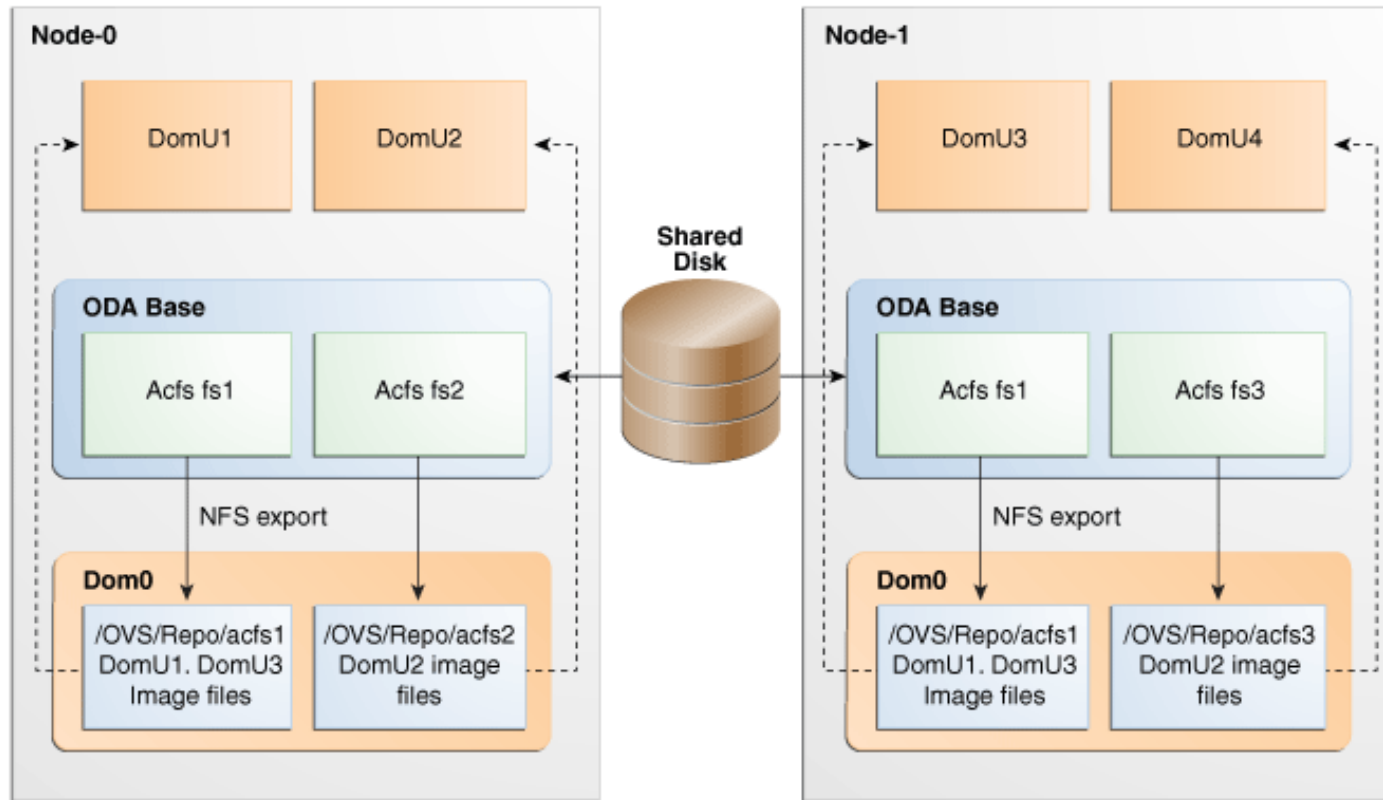
- **“Oracle préfère la qualité CPU à la quantité.”**

Règles générales

Usage	CPU recommandé
OLTP	Peu mais rapides
Batch	Plus de cœurs
RAC	Répartition équilibrée

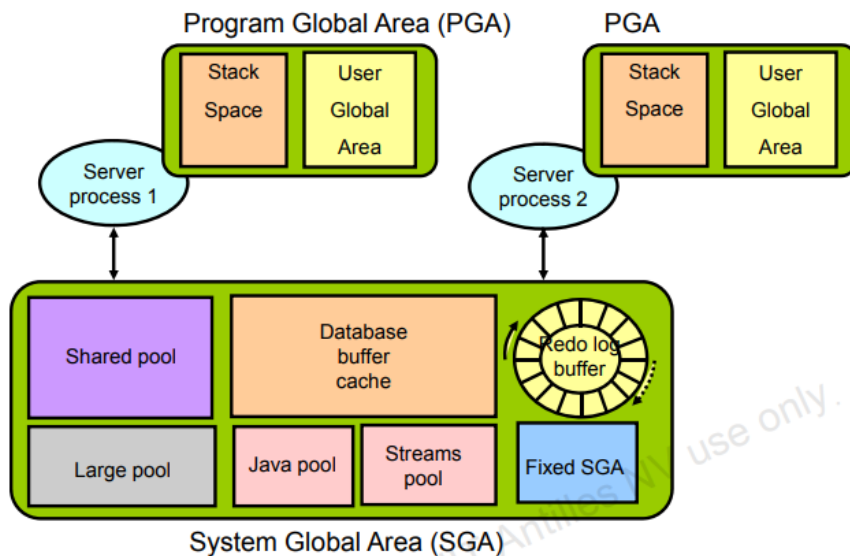
☛ Oracle aime :

- Peu de vCPU rapides
- Pas d'overcommit agressif



Mémoire — Le nerf de la guerre

Oracle Database Memory Structures



- ***“Une base sans mémoire libre côté OS devient instable.”***

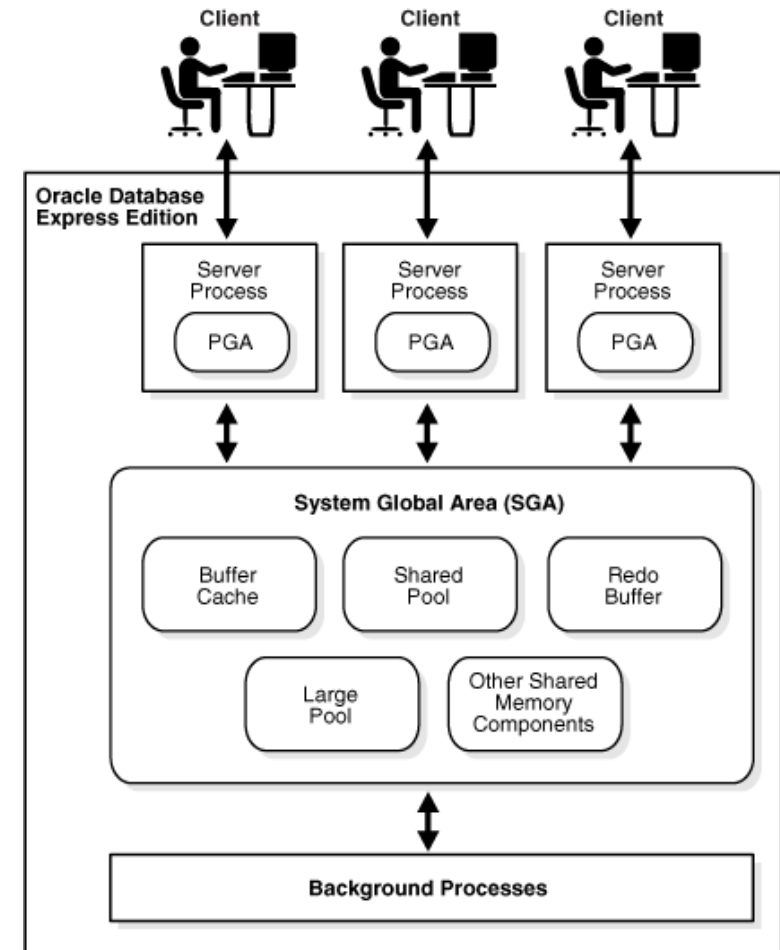
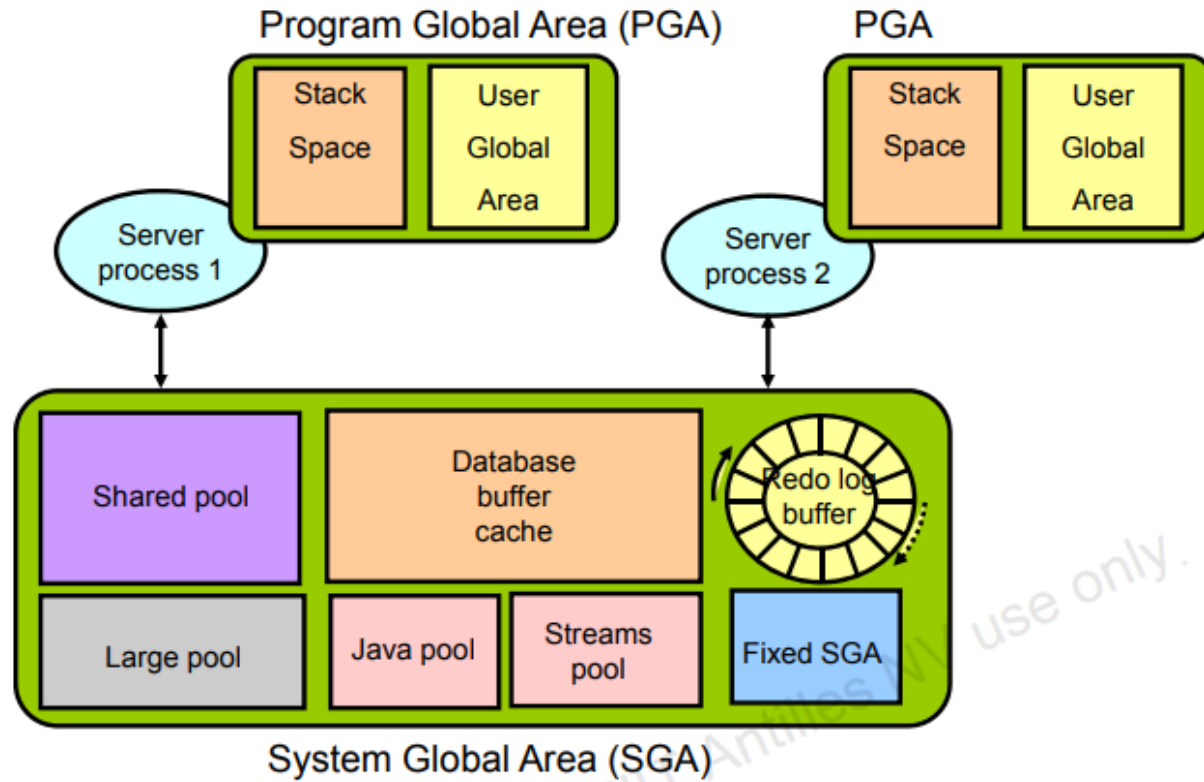
Règle empirique

RAM totale	Oracle
64 Go	40–48 Go Oracle
128 Go	90–100 Go Oracle

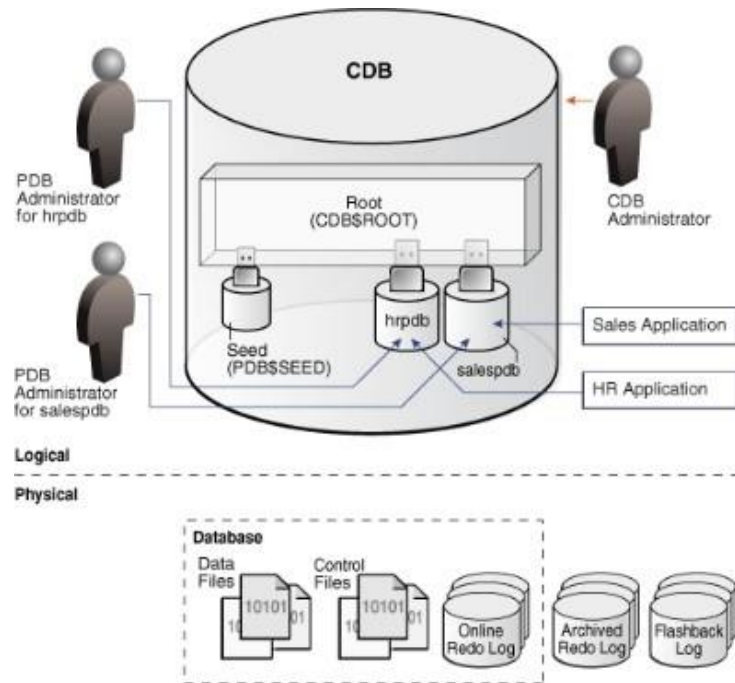
Toujours laisser de la mémoire à l'OS :

- Cache disque
- Processus système

Oracle Database Memory Structures



Installation Oracle — Bonnes pratiques terrain

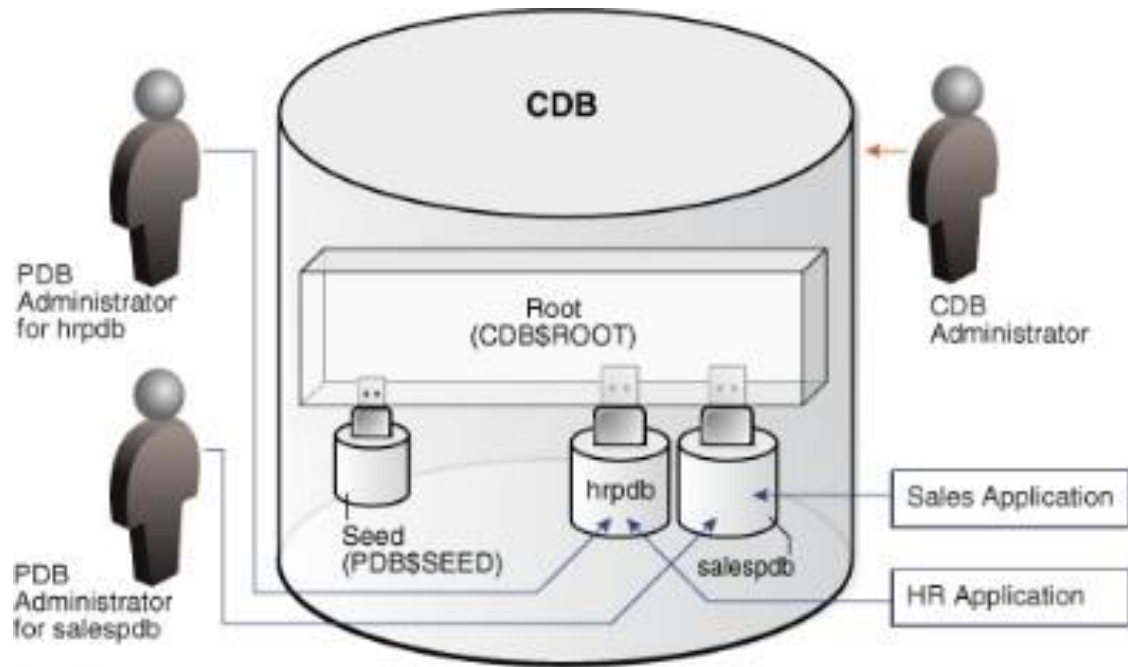


Points clés

- Installation en silent mode
- Comptes dédiés (oracle , grid)
- ORACLE_BASE propre
- Séparation binaries / data

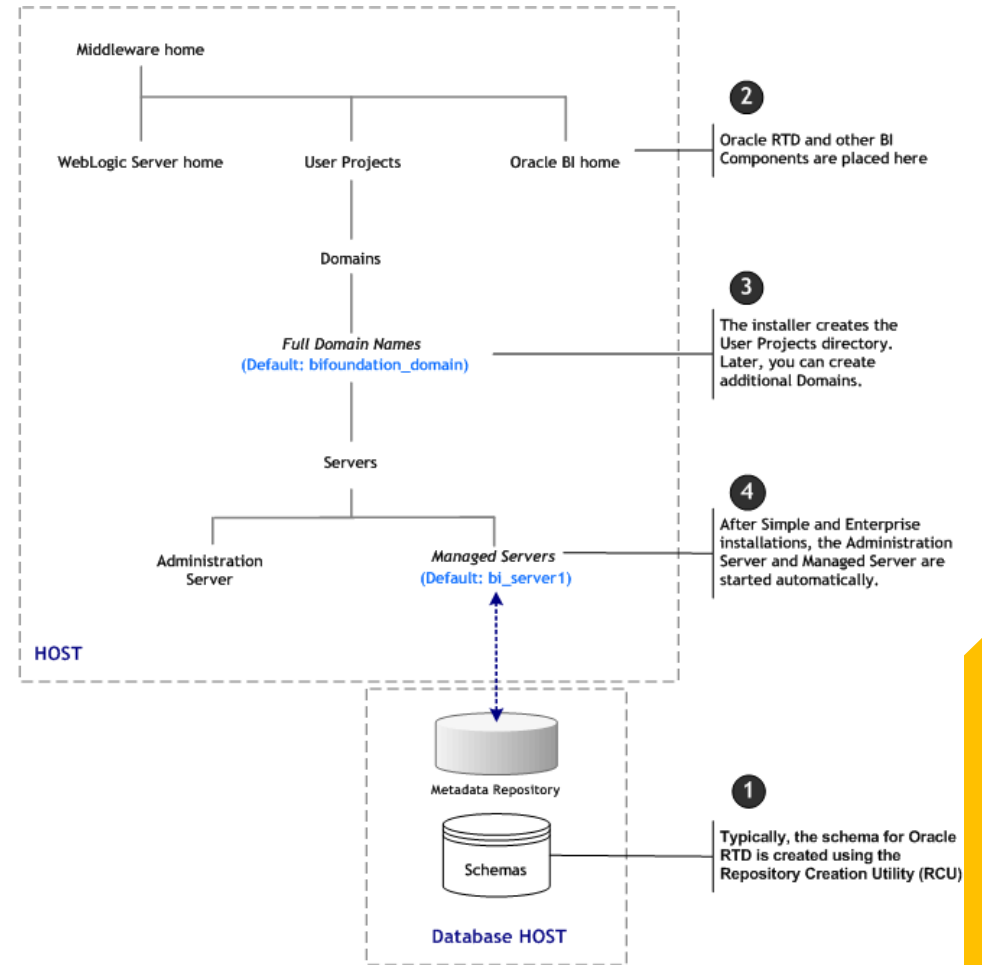
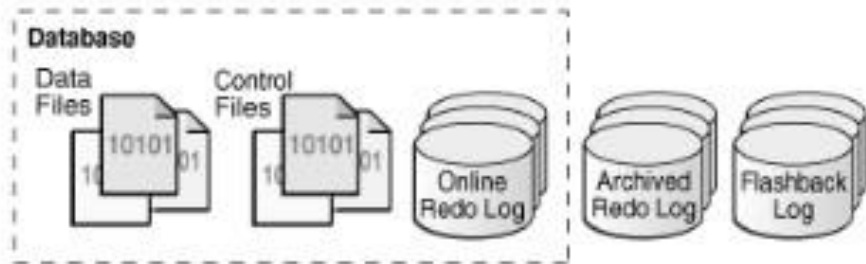
```
./runInstaller -silent -responseFile db_install.rsp
```

- ***“Tout ce qui est répétable doit être scripté.”***

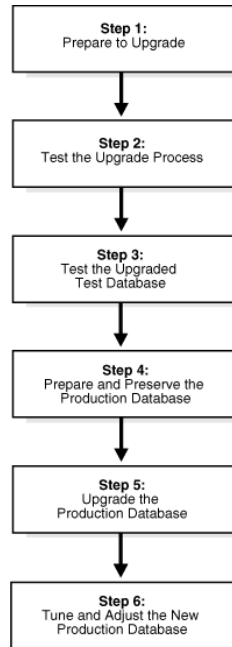


Logical

Physical



Montées de version Oracle (Upgrade)



- **“Une montée de version est un projet, pas une commande.”**

Méthodes

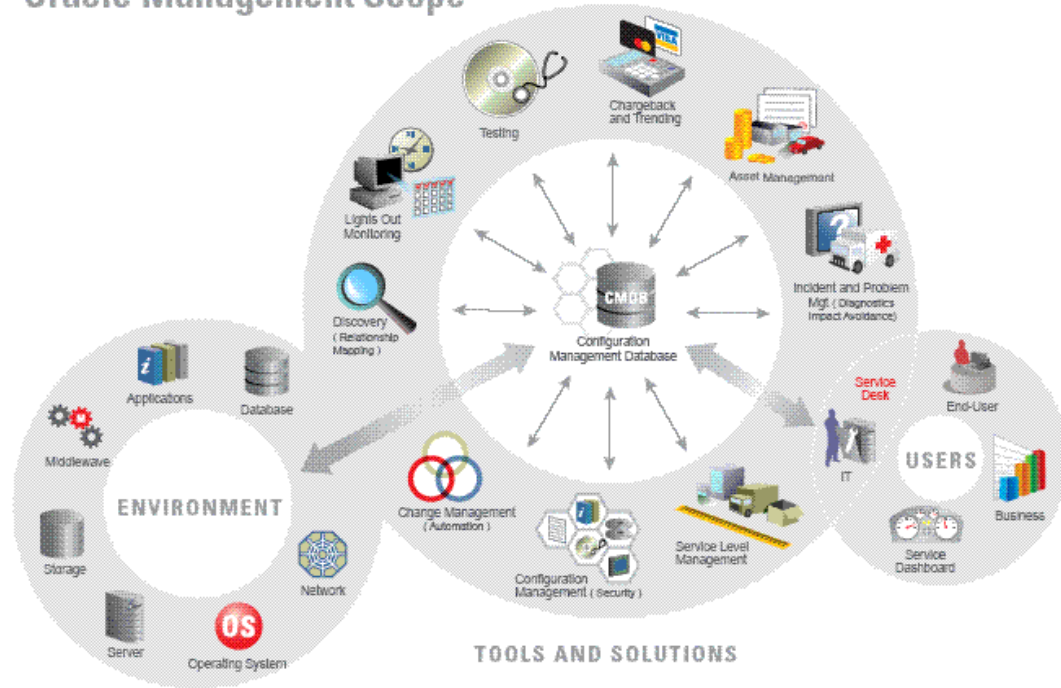
Méthode	Usage
DBUA	Simple
Manual	Contrôle fin
Data Pump	Migration propre

Étapes critiques

- 1 Test compatibilité
- 2 Backup complet
- 3 Upgrade binaire
- 4 Upgrade dictionnaire
- 5 Tests applicatifs

Patching Oracle & OS (Coordination cruciale)

Oracle Management Scope



Bonnes pratiques

- OS patché avant Oracle
- Respect kernel certifié
- Test en pré-prod obligatoire


Sécurité Red Hat + Oracle

Incident réel typique

Oracle instable après reboot

Cause : HugePages mal configurées

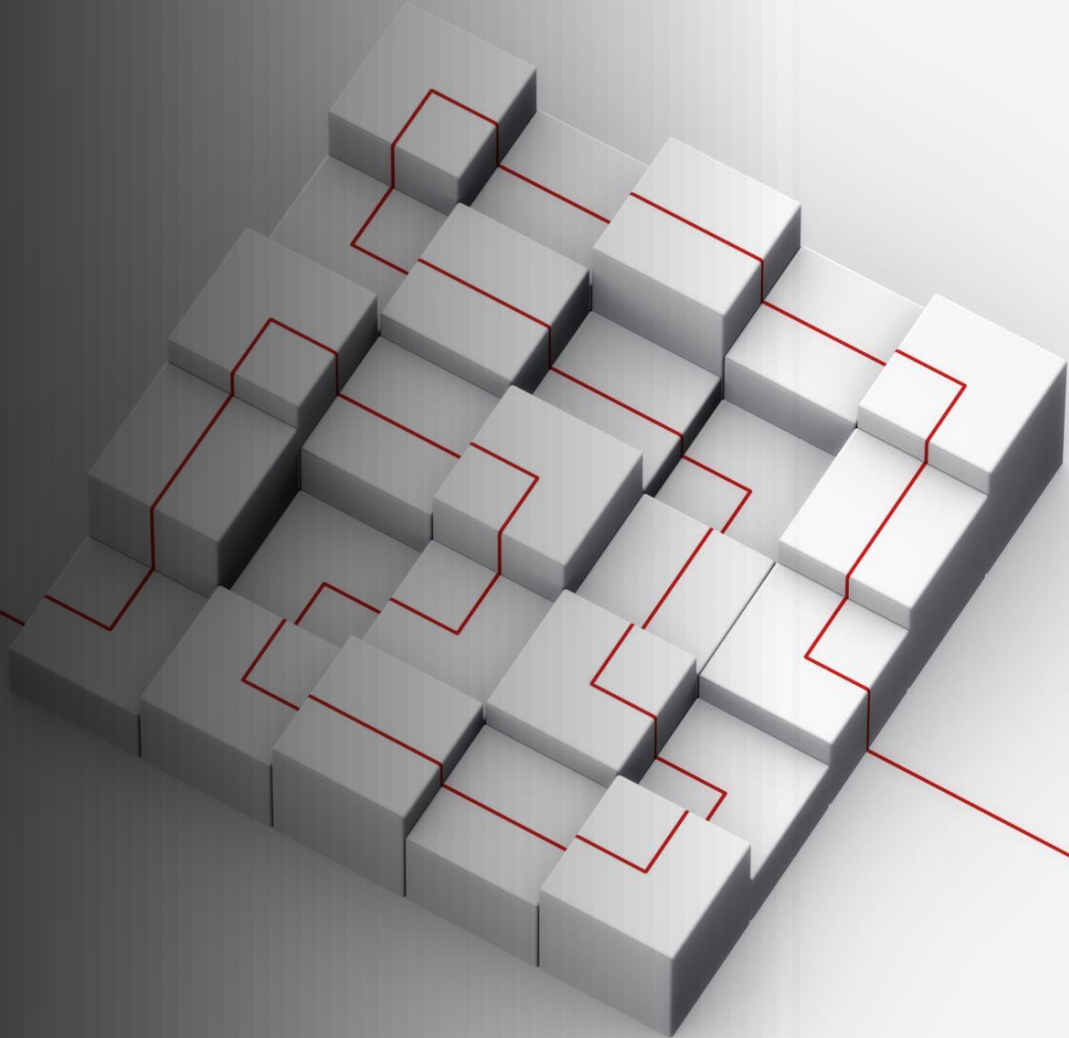
Résultat : swap + perf catastrophique

 Correction OS = stabilité retrouvée

“Une base Oracle ne dépasse jamais la qualité de son système Red Hat. Le DBA doit maîtriser l’OS autant que la base.”



DBA ORACLE : LES BASES



C'est quoi le métier de DBA Oracle ?

Être DBA Oracle, ce n'est pas juste "gérer une base de données".

C'est être le garant technique du cœur du système d'information.

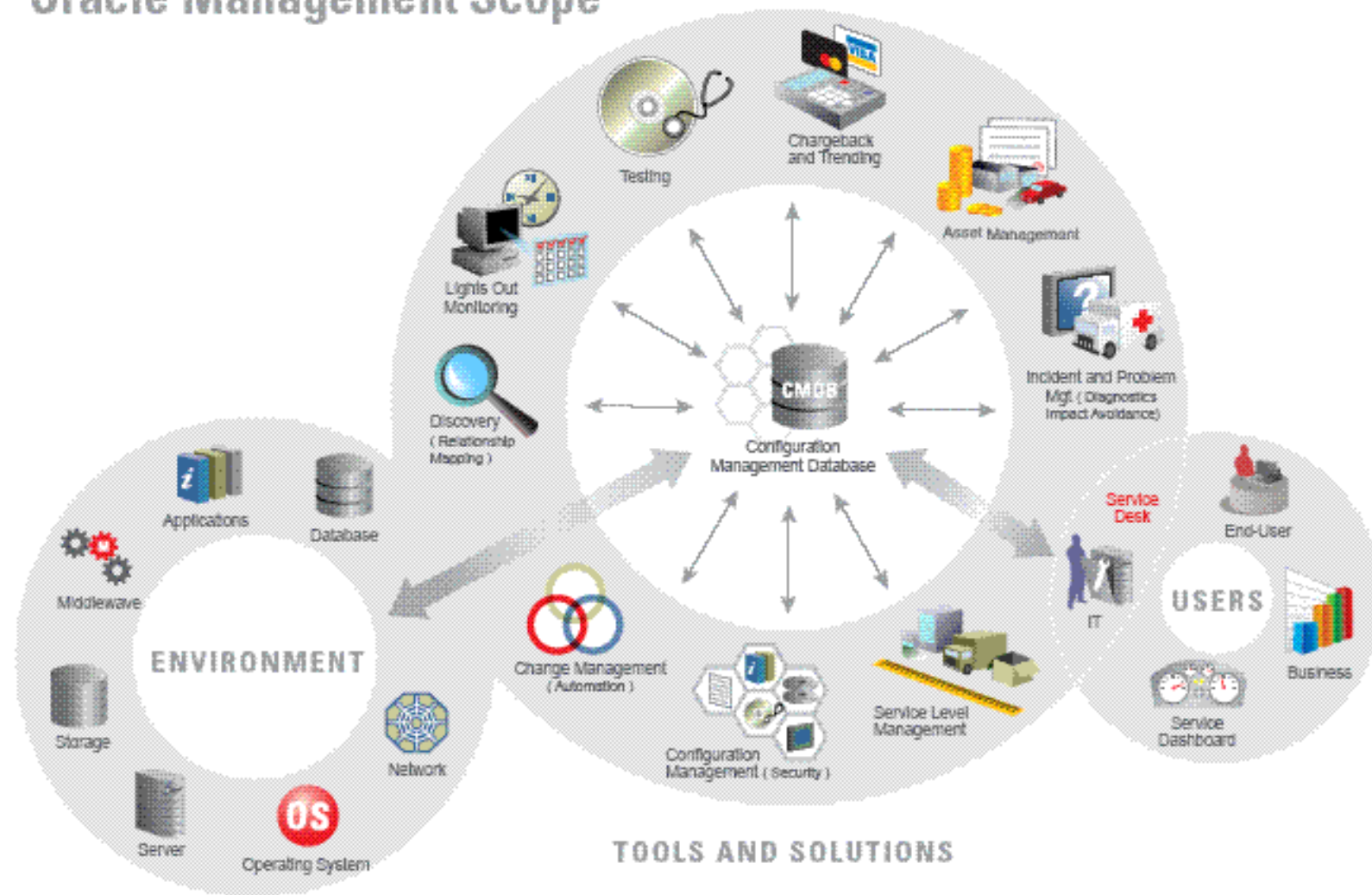
Une base Oracle contient souvent :

- 💰 les transactions financières
- 🏭 les données de production
- 🧠 les données métier critiques
- 🔒 les informations sensibles de l'entreprise

Le DBA est donc à la fois architecte, mécanicien de précision, gardien de la sécurité et pompier de service.



Oracle Management Scope



Le rôle du DBA Oracle, concrètement

1. Rôle fondamental

Le DBA (Database Administrator) est le garant de la fiabilité, des performances et de la sécurité des données de l'entreprise.

👉 Pour un CTO, le DBA est celui qui protège le cœur du SI : la donnée.

Il intervient sur des bases comme Oracle, PostgreSQL, MySQL, ou des services cloud type Amazon Web Services / Microsoft Azure.

Les 5 piliers du métier de DBA

1. Disponibilité (High Availability)

2. Performance

3. Sécurité des données

4. Fiabilité & Intégrité

5. Évolutivité (Scalabilité)



1 Disponibilité (High Availability)

- Mise en place de réplication / cluster
- Stratégies de PRA / DRP (reprise après sinistre)
- Sauvegardes fiables + tests de restauration
- Supervision 24/7 des incidents critiques

🎯 Objectif business : zéro interruption de service

2 Performance

- Les données ne sont ni perdues ni corrompues
- Les transactions respectent l'ACID
- Les migrations se font sans risque
- Les structures de tables restent cohérentes

🎯 Objectif business : données exactes et exploitables

3 Sécurité des données

- Gère les droits d'accès (principe du moindre privilège)
- Met en place chiffrement, audit, traçabilité
- Protège contre injections SQL, exfiltration, accès non autorisés
- Participe à la conformité (RGPD, ISO, etc.)

🎯 Objectif business : aucune fuite de données

4 Fiabilité & Intégrité

- Analyse les requêtes lentes
- Optimise index, plans d'exécution, statistiques
- Travaille avec les développeurs pour corriger le SQL
- Surveillance CPU, RAM, I/O, verrous, contention

🎯 Objectif business : applications rapides et scalables

5 Évolutivité (Scalabilité)

- Anticipe la montée en charge
- Met en place partitionnement, sharding, réplication
- Planifie les montées de version
- Aide à l'architecture data (monolithique → distribué)

🎯 Objectif business : croissance sans refonte d'urgence

Les 5 Piliers qui forment la base d'un DBA



La vraie valeur d'un DBA

Un bon DBA Oracle :

- ✓ Anticipe les problèmes avant qu'ils arrivent
- ✓ Comprend l'infrastructure (OS, stockage, réseau)
- ✓ Dialogue avec les développeurs et les architectes
- ✓ Sait intervenir en situation critique
- ✚ Quand tout va bien, on ne le voit pas.

Quand ça va mal, il devient la personne la plus importante de l'entreprise.



Les missions contrêtes au quotidien

Un CTO veut entendre du concret opérationnel :

- Installer et configurer les bases
- Mettre en place les sauvegardes automatiques
- Surveiller les performances et incidents
- Optimiser les requêtes critiques
- Gérer les montées de version
- Participer aux choix d'architecture
- Documenter et automatiser





Vos directions techniques attendant de vous que :

- ✓ Il anticipe les problèmes
- ✓ Il automatise
- ✓ Il documente
- ✓ Il parle business (risque, coût, impact)
- ✓ Il collabore avec les devs



DBA : les 2 lois

-  Le DBA Oracle est le gardien de la performance, de la sécurité et de la disponibilité des données critiques.
-  Il assure que le système d'information repose sur une base **fiable, rapide et résiliente**.

En Résumé

- “Le DBA est le garant de la disponibilité, des performances et de la sécurité des données.
- Il protège l’entreprise contre la perte de données, les ralentissements critiques et les failles de sécurité.
- Il travaille à la fois sur l’optimisation technique, la fiabilité opérationnelle et l’anticipation de la croissance.
- C’est un rôle clé entre développement, infrastructure et sécurité.”



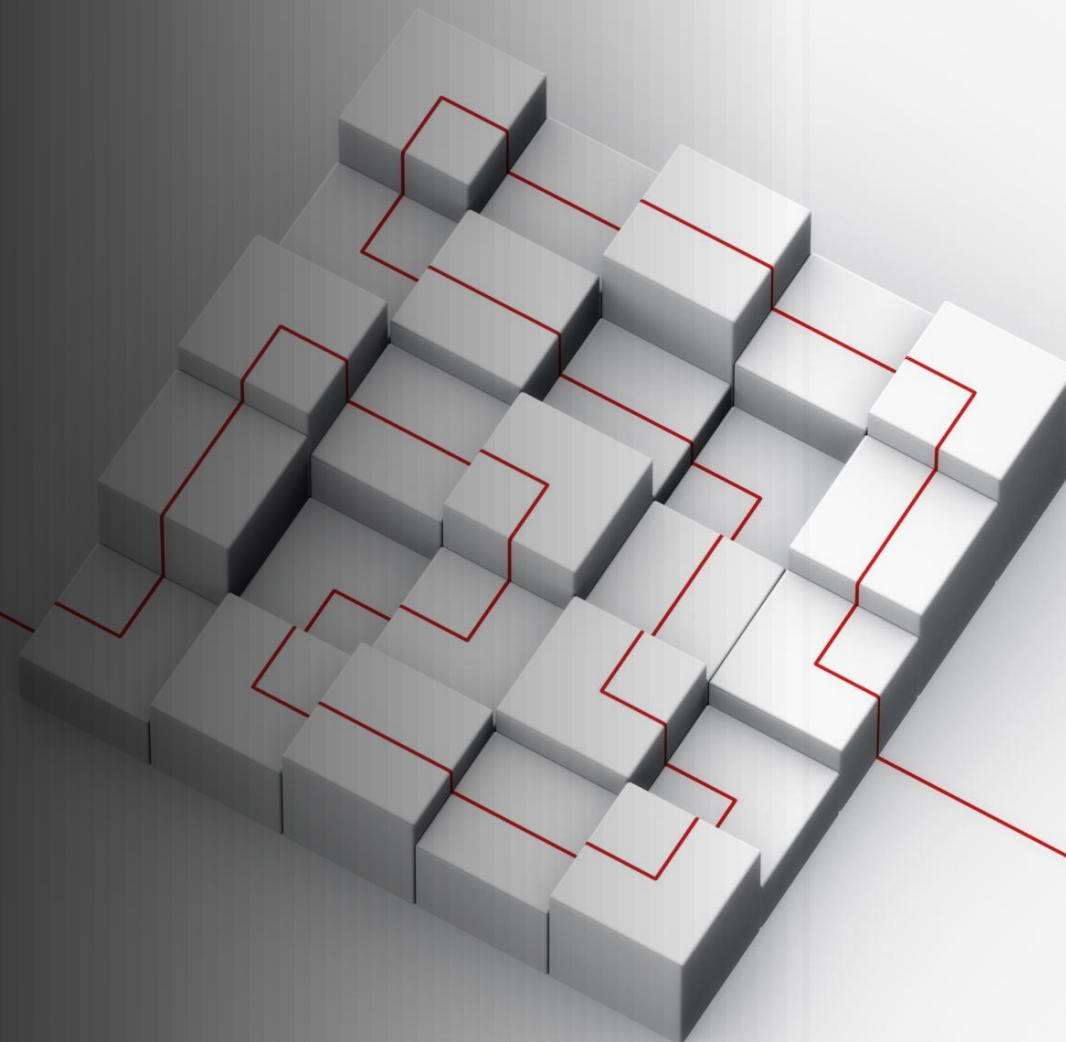
AGENDA DU COURS

- 1. Fondations Oracle – Comprendre le moteur
- 2 Installation & Architecture d'Infrastructure
- 3 Performance Tuning (Le cœur du métier)
- 4 Conception & Modélisation des Bases
- 5 Sécurité Oracle (Critique en 2026)
- 6 Haute Disponibilité & Continuité d'Activité
- 7 Supervision & Observabilité
- 8 Maintenance & Exploitation Quotidienne
- 9 Optimizer & Statistiques (Niveau Expert)
- 10 Oracle & le Cloud Moderne
- 11 Automatisation & DevOps pour DBA
- 12 Troubleshooting Avancé (Cas Réels)
- 13 Gouvernance & Rôle Stratégique du DBA
- **14 PL/SQL**





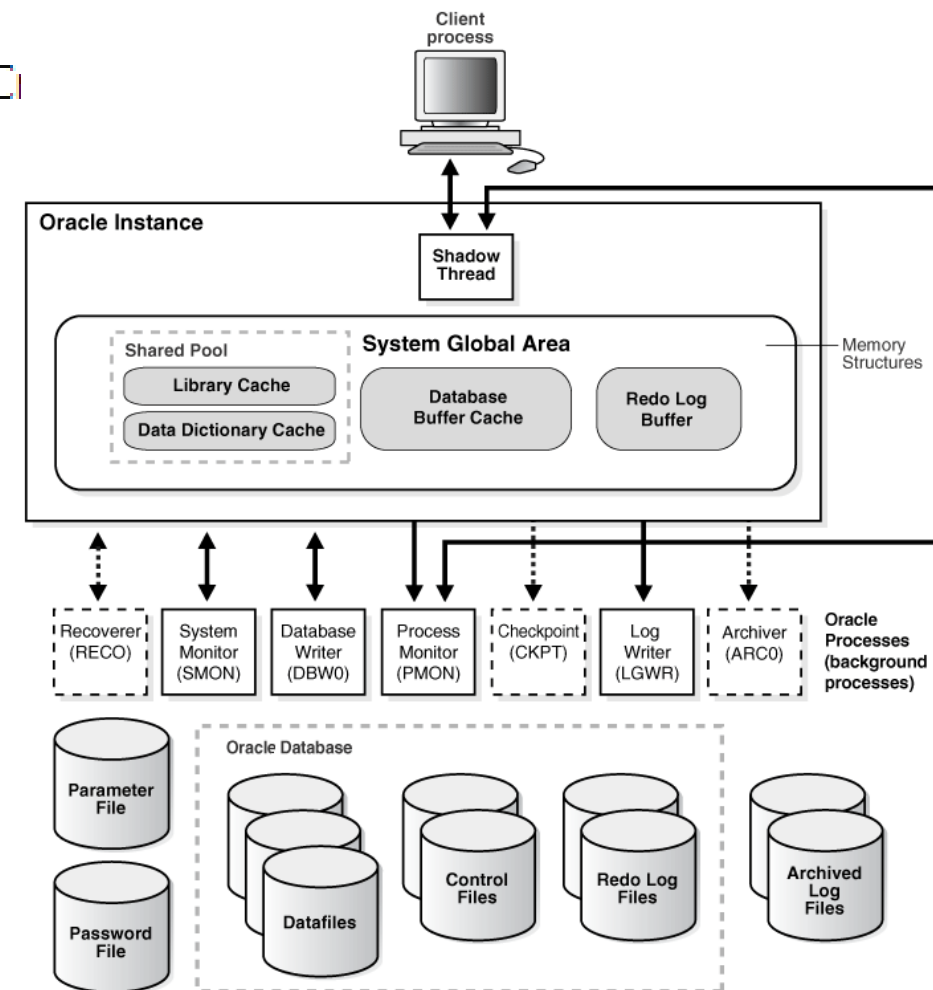
1 FONDATIONS ORACLE

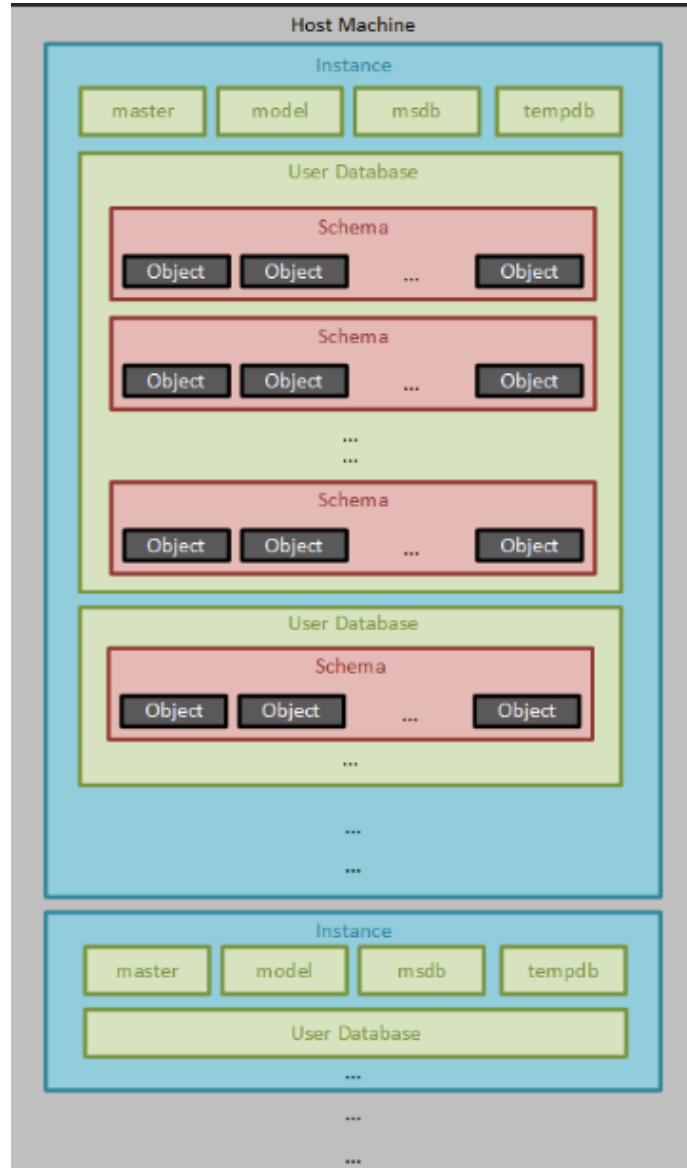


FONDATION ORACLE

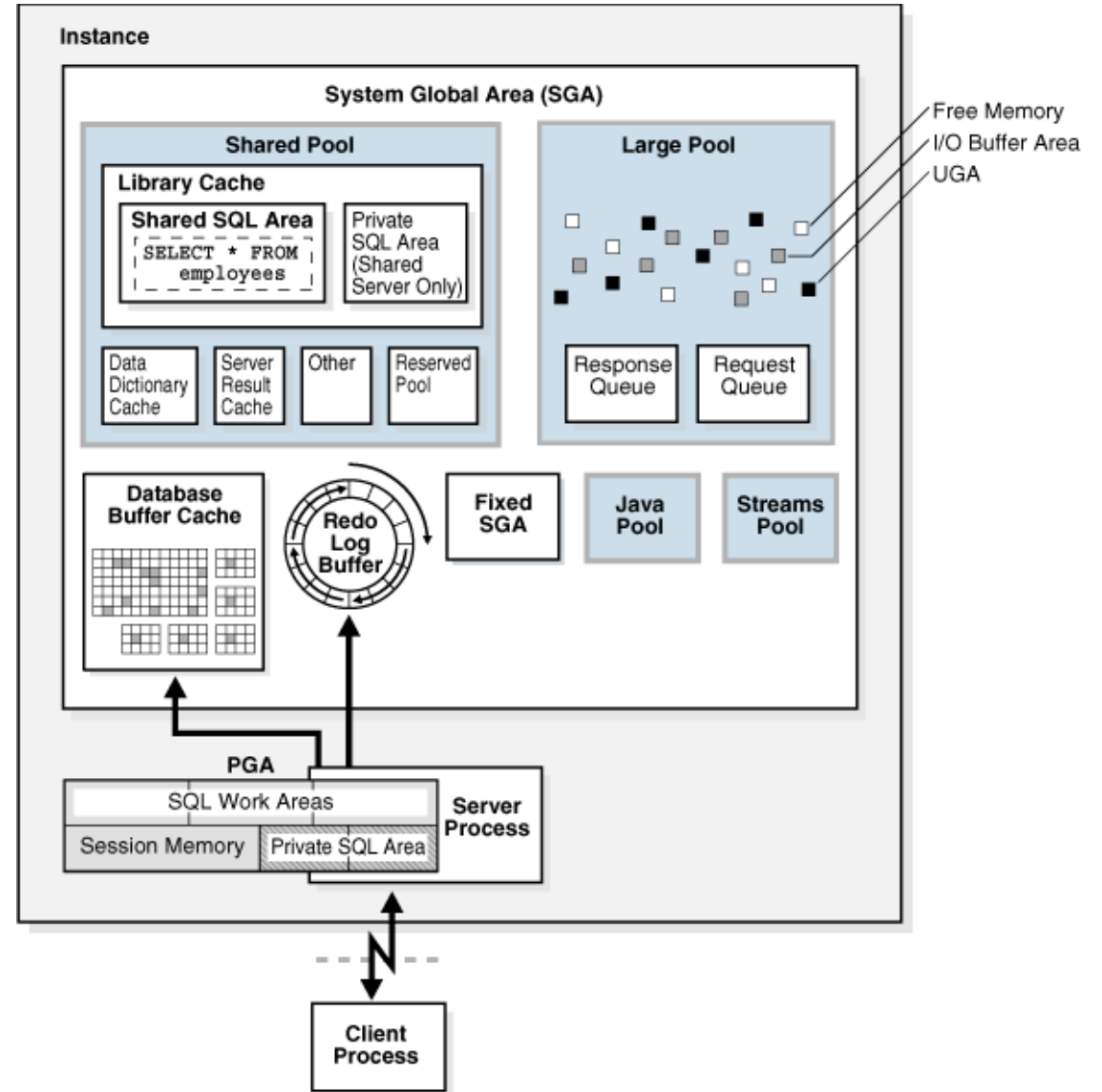
- Architecture Oracle : Instance vs Database
- Mémoire : SGA / PGA / Shared Pool / Buffer Cache
- Processus background : SMON, PMON, LGWR, DBWR, CKPT, ARC
- Redo / Undo / Control Files / Datafiles
- SCN, Consistency Model, Read Consistency
- Multitenant : CDB / PDB (indispensable en 2026)

***Comprendre comment Oracle respire
pour savoir pourquoi il souffre.***



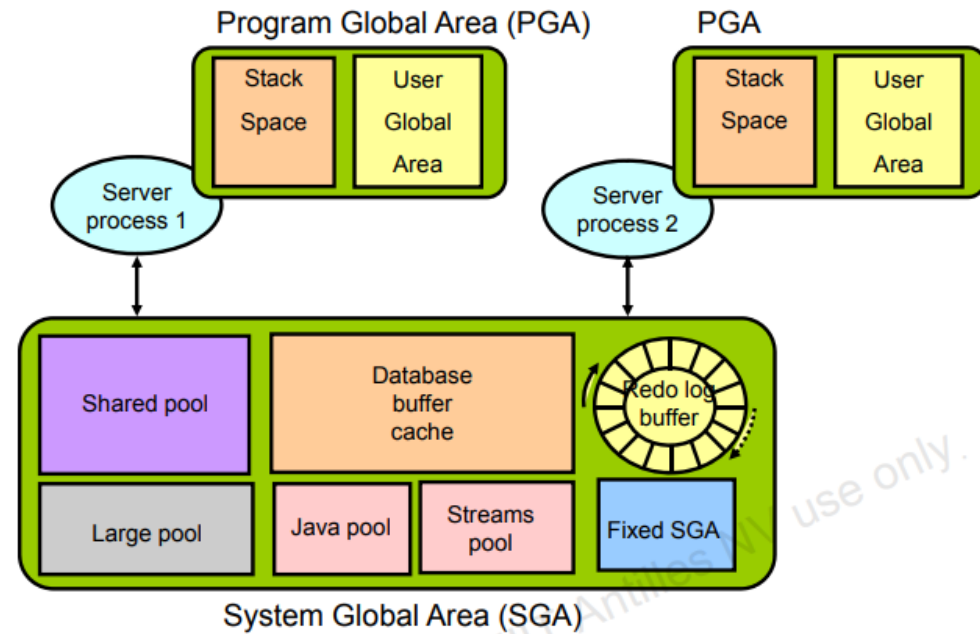


ARCHITECTURE MEMOIRE



STRUCTURE DE LA MEMOIRE

Oracle Database Memory Structures



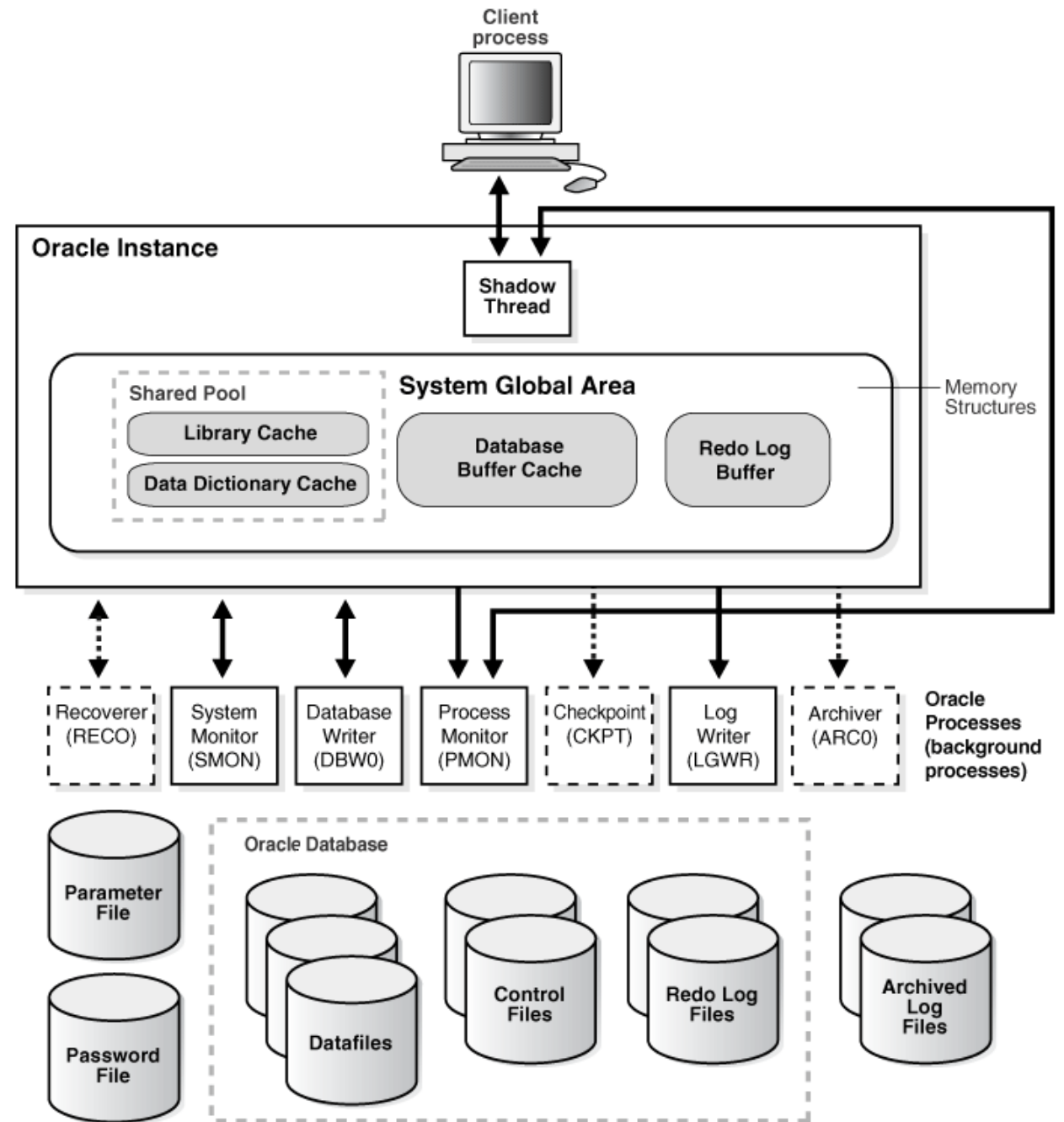
AGENDA GESTION INTERNE ORACLE

- 1. Architecture Oracle : Instance vs Database
- 2. Mémoire Oracle : SGA / PGA
- 3. Processus Background
- 4. Redo / Undo / Consistency Model
- 5. SCN — Le Temps Oracle
- 6. Multitenant Architecture (CDB / PDB)
- 7. Exemple de Script “Santé Instance”



1. Internes du système Oracle

Architecture Oracle : Instance vs Database



Concepts Clés

Élément	Rôle
Instance	Mémoire + Processus Oracle
Database	Fichiers physiques (datafiles, redo logs, control files)

Incident réel typique

Symptôme : Base "down" après redémarrage serveur

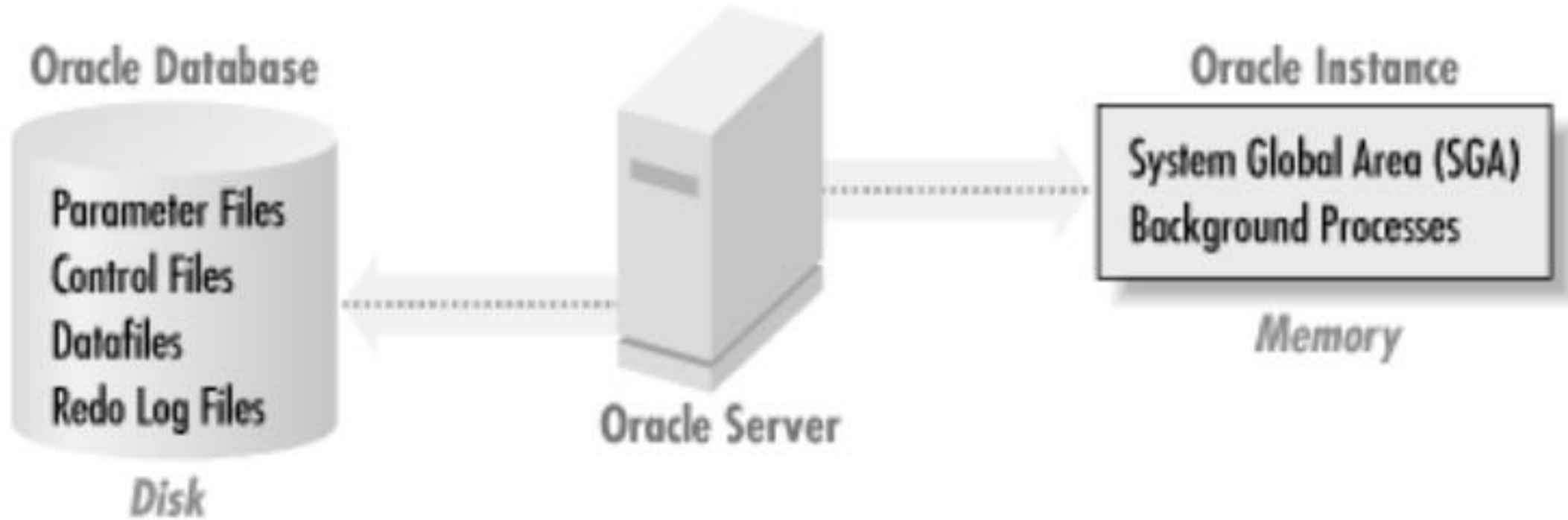
Cause : Instance démarrée mais fichiers FRA pleins → ARCH bloqué → DB en MOUNT seulement

Message Clé

- “Je vérifie toujours l’espace FRA avant un redémarrage planifié.”



Oracle Server



Message Clé

- “Je comprends comment Oracle pense en interne, donc je peux expliquer pourquoi une base est *lente* ou *instable*.”



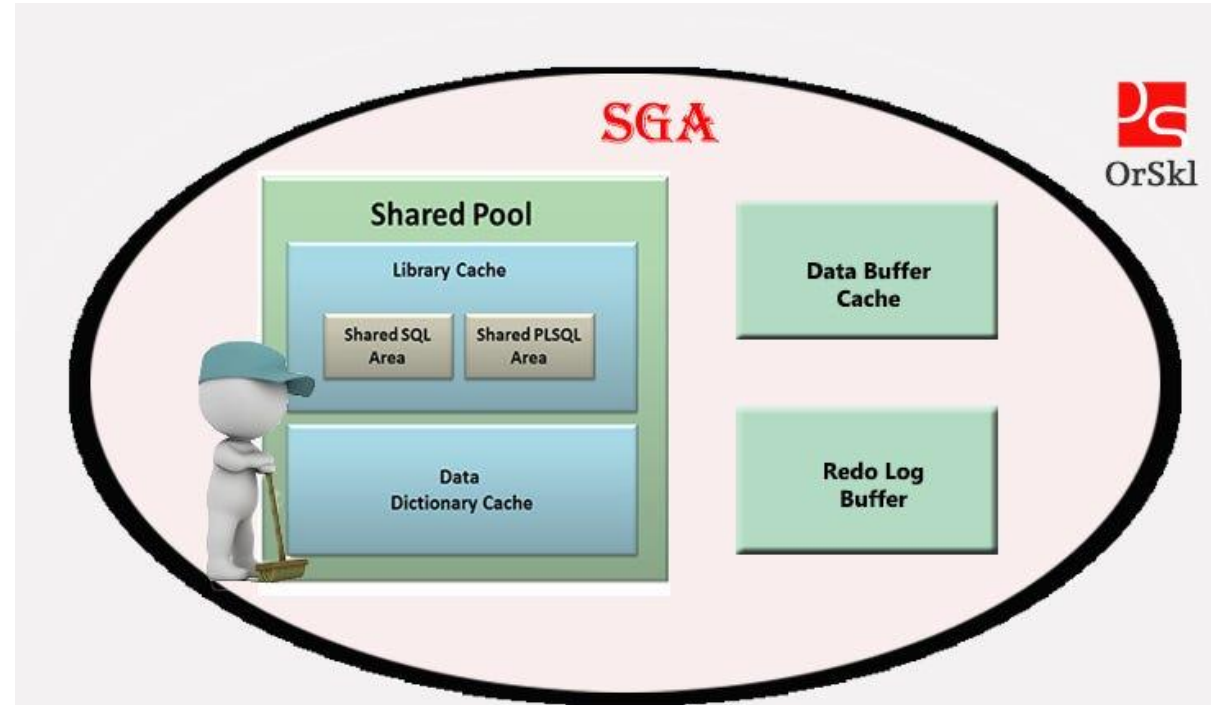
2. Mémoire Oracle : SGA / PGA



SGA

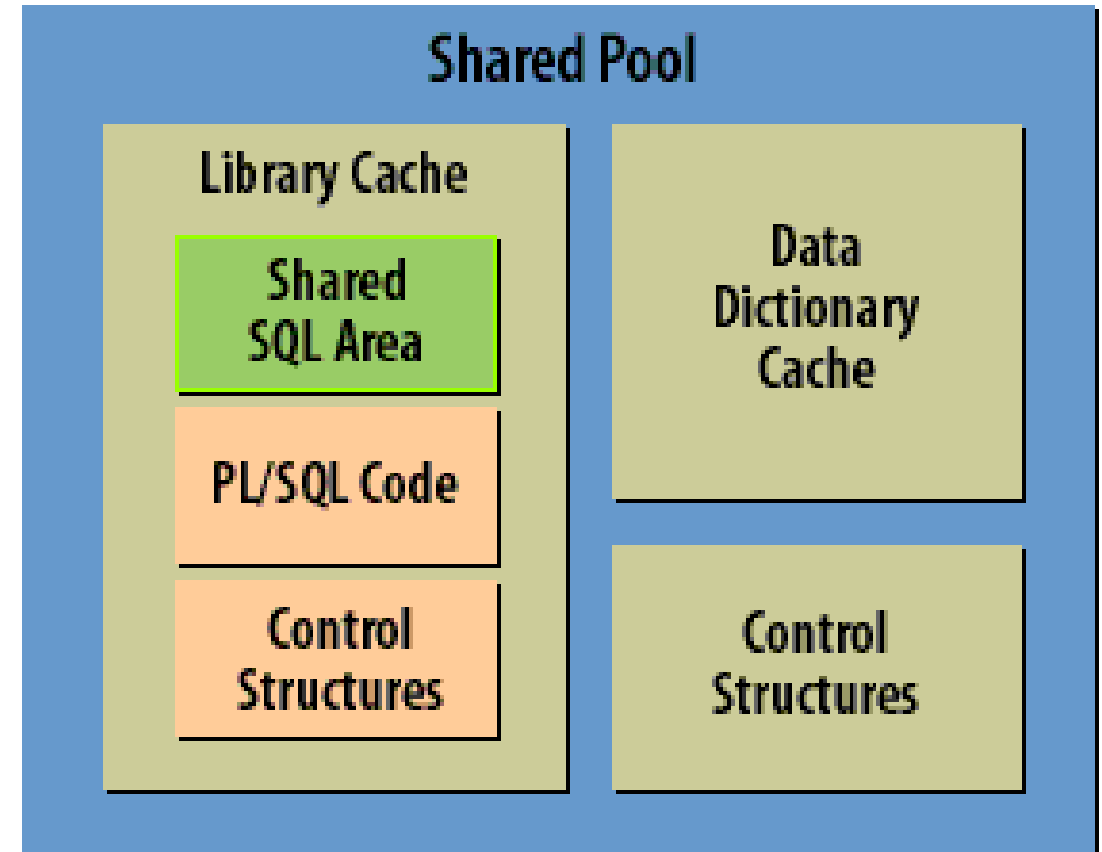


- Buffer Cache → blocs de données
- Shared Pool → SQL + dictionnaire
- Redo Log Buffer
- Large / Java Pool



SGA = mémoire partagée (instance)

SHARED POOL



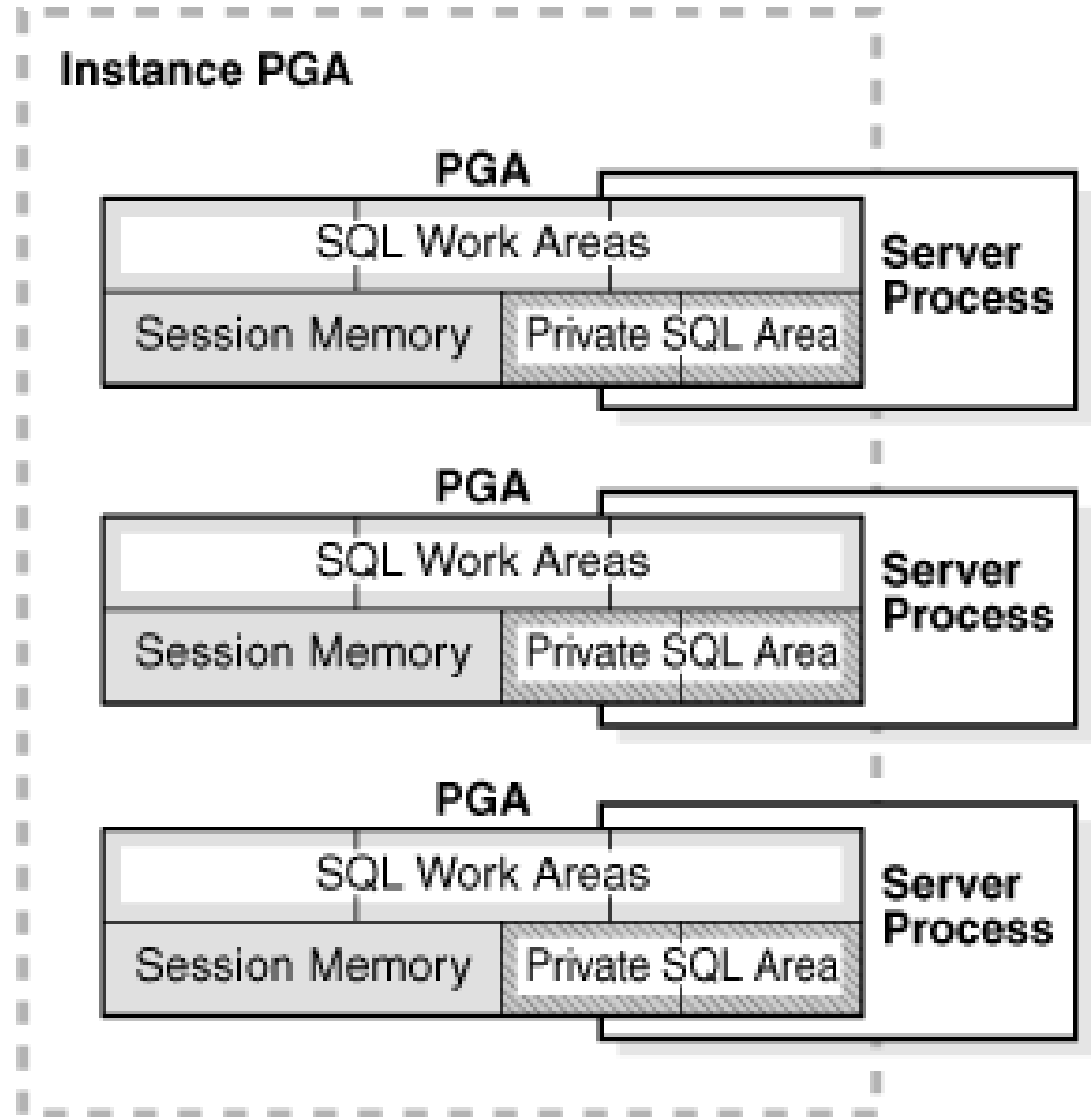
The shared SQL area contains parse trees and execution plans for SQL statements.



PGA



PGA =
mémoire
privée session



Incident réel

Symptôme : CPU 100% + "library cache lock"

Cause : Shared Pool trop petit → hard parsing massif

Script Diagnostic

```
SELECT name, value  
FROM v$parameter  
WHERE name LIKE '%shared_pool%';
```



Solution appliquée

```
ALTER SYSTEM SET shared_pool_size=4G SCOPE=SPFILE;
```



3. Processus Background

Processus

Rôle Critique

DBWR

Écrit les blocs vers disque

LGWR

Écrit le redo (commit = dépend de lui)

SMON

Recovery instance

PMON

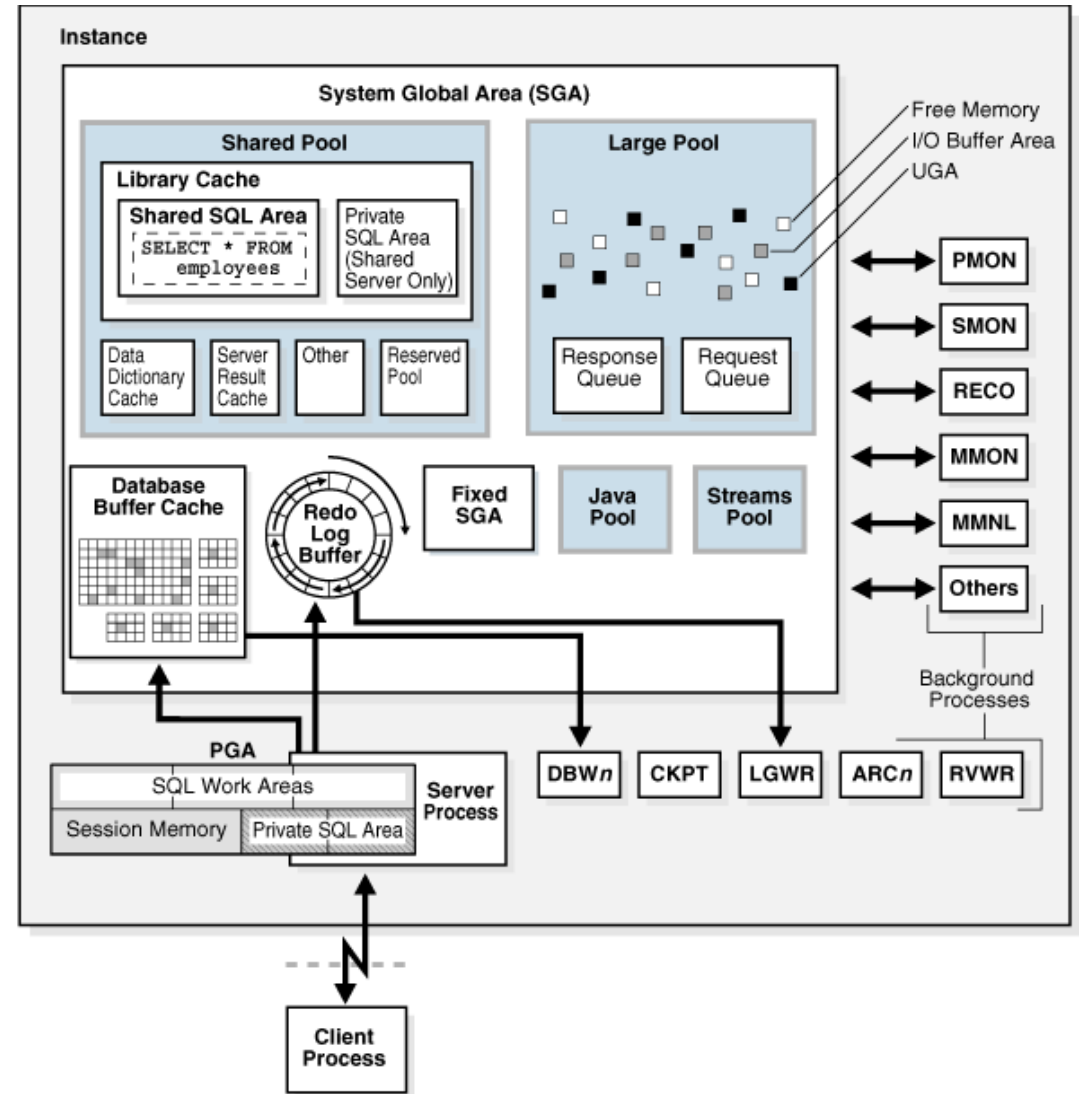
Nettoyage sessions mortes

ARCn

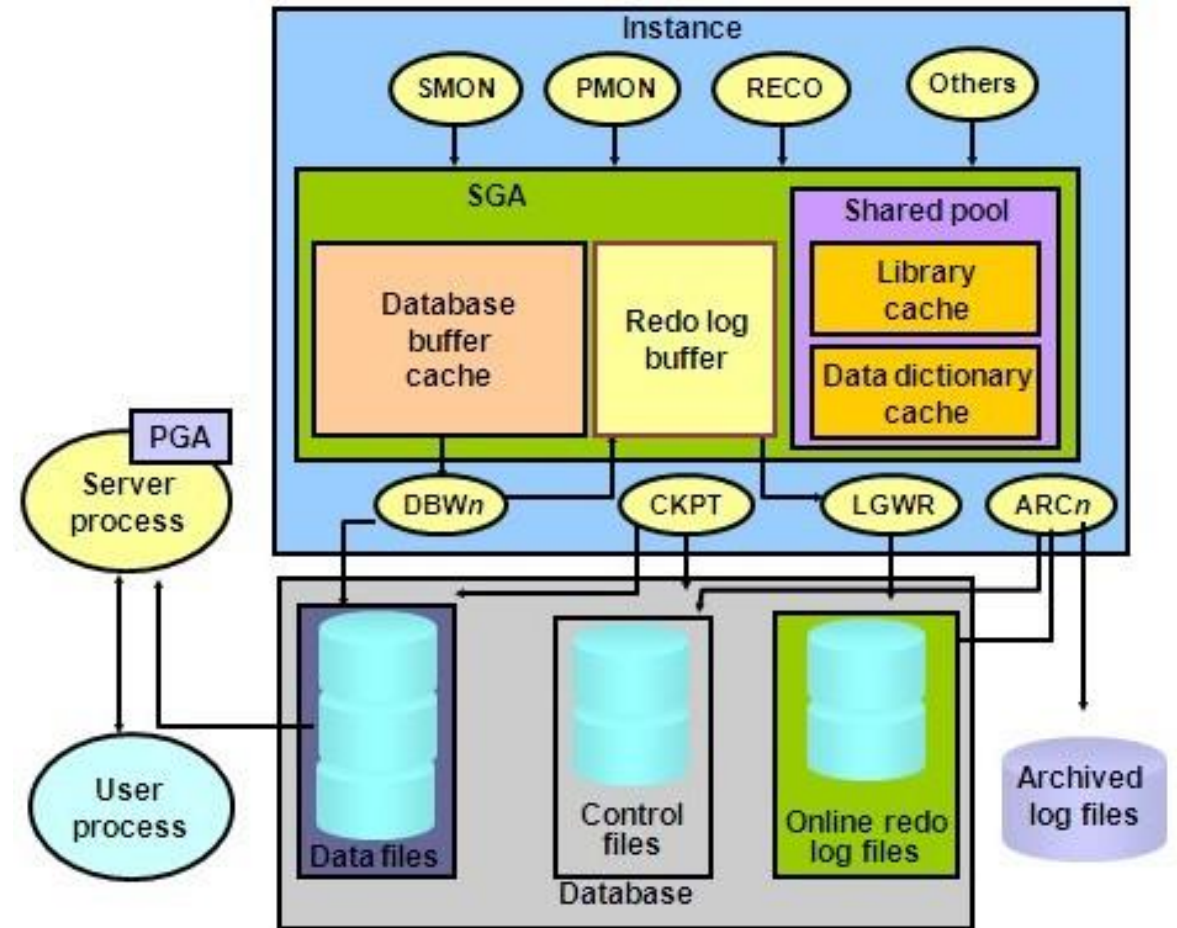
Archive redo logs



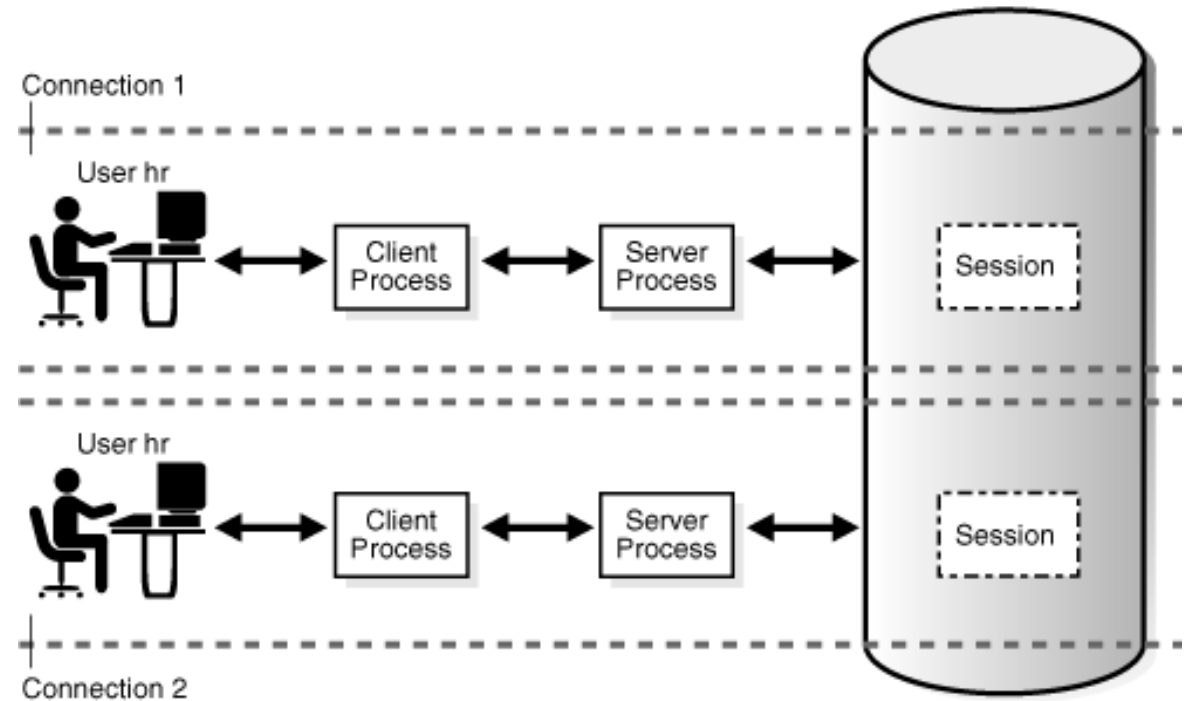
System Global Area (SGA)



PGA ARCHITECTURE



ORACLE CLIENT-SERVER PROCESS



🔥 Incident réel

Symptôme : Application figée sur COMMIT

Cause : LGWR en attente I/O (stockage saturé)



Preuve technique

 Copier le code

```
SELECT event, total_waits, time_waited  
FROM v$system_event  
WHERE event LIKE 'log file sync';
```

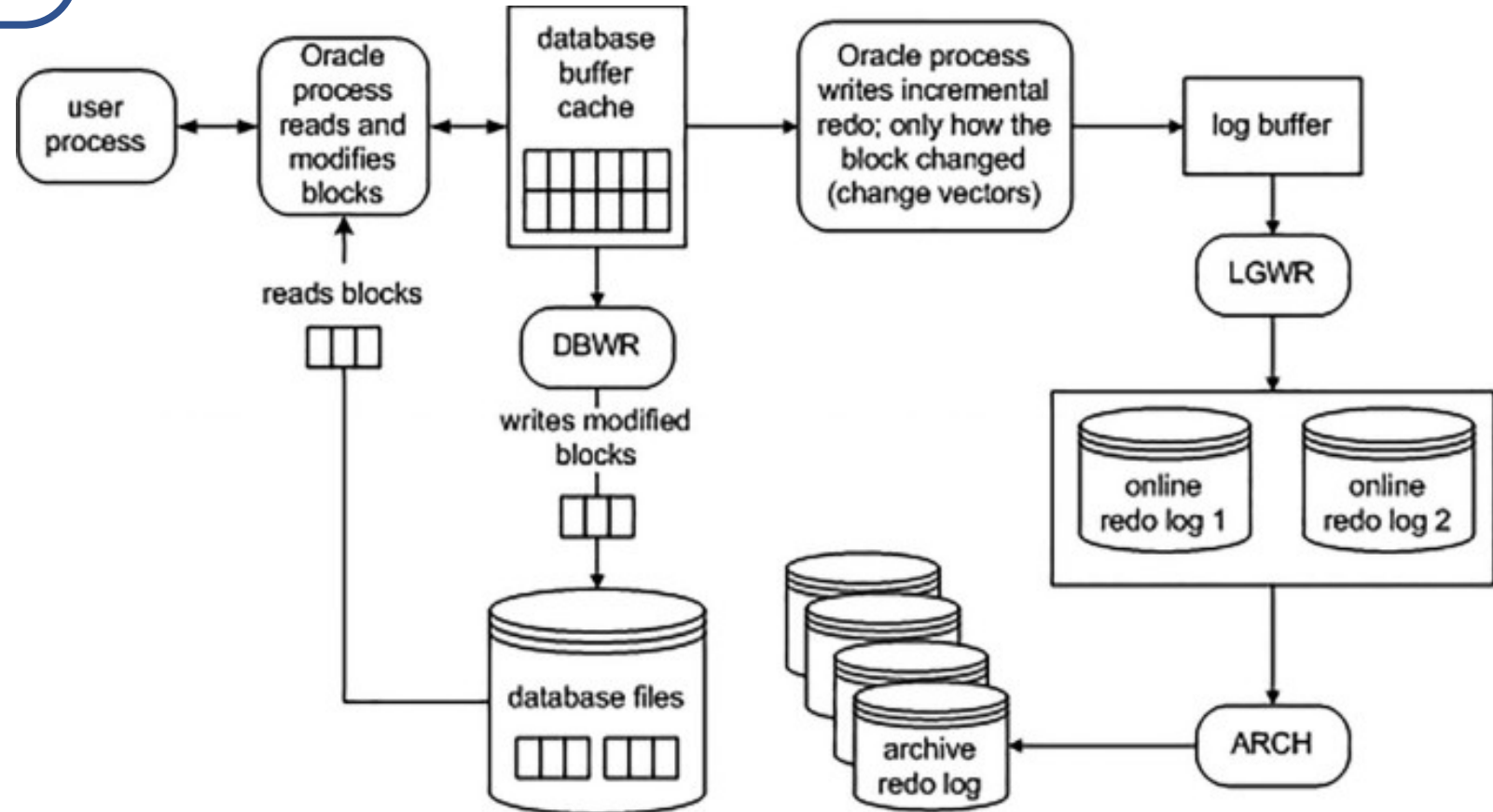
“Quand LGWR souffre, toute l’entreprise ralentit.”

4. Redo / Undo / Consistency Model

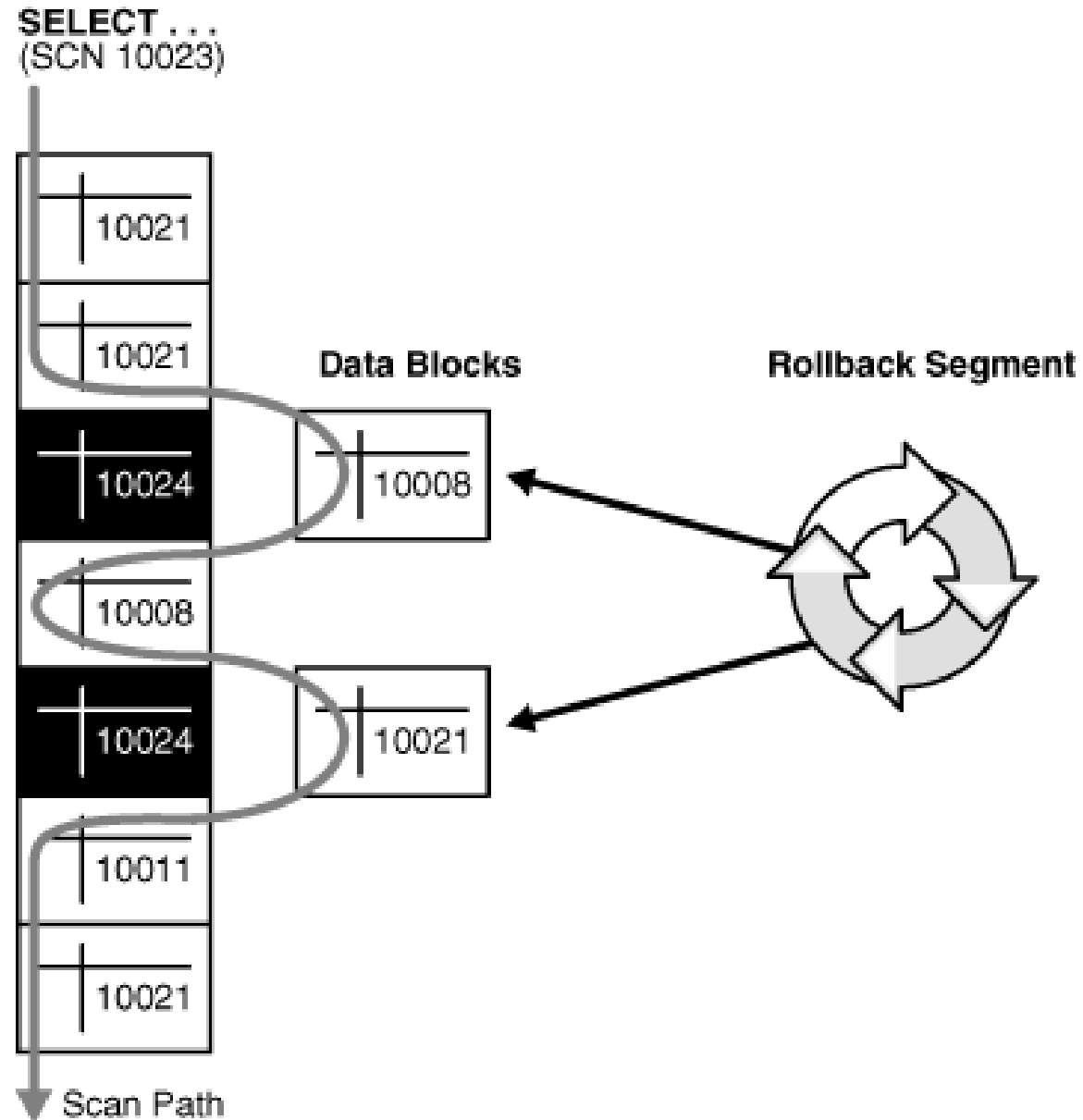


UNDO REDO LOG

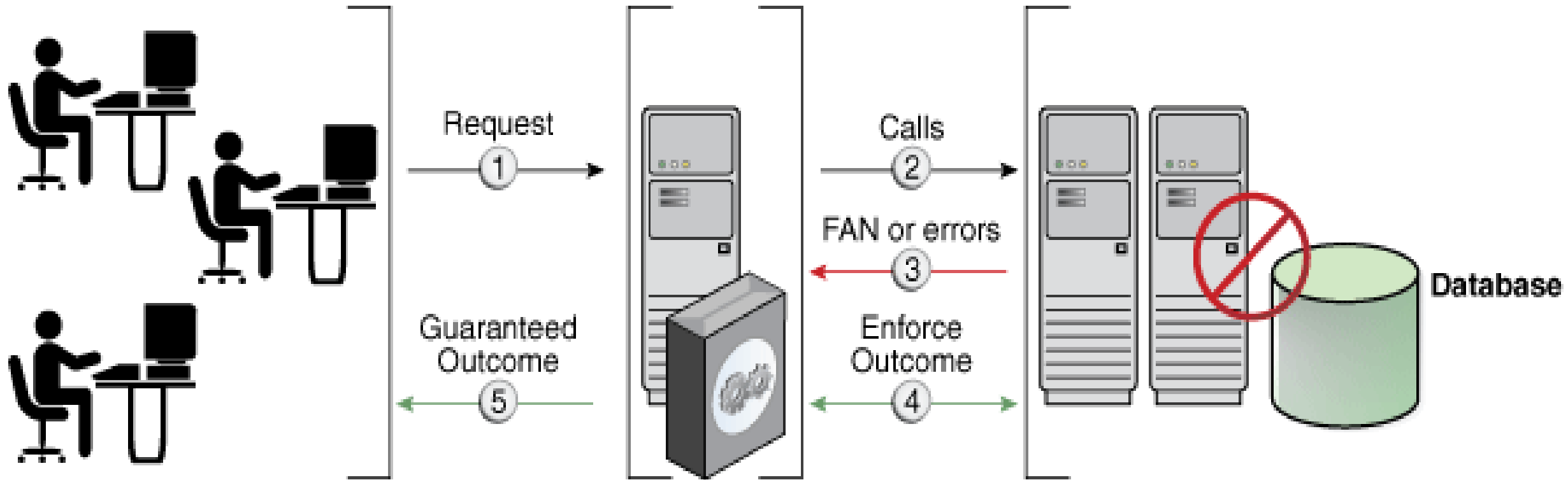
□ REDO = rejouer l'historique
↔ UNDO = remonter le temps



ROLLBACK PROCESS



FAN OR ERRORS PROCESS

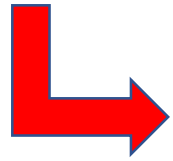


Oracle ne bloque pas les lectures → il reconstruit une image cohérente grâce à l'UNDO.

GESTION D'INCIDENT - CAS D'ECOLE

🔥 Incident réel

Erreur :



```
ORA-01555: snapshot too old
```

Cause :

Undo trop petit pour requête longue

Diagnostic :



```
SELECT tuned_undoretention FROM v$undostat;
```



5. SCN — Le Temps Oracle



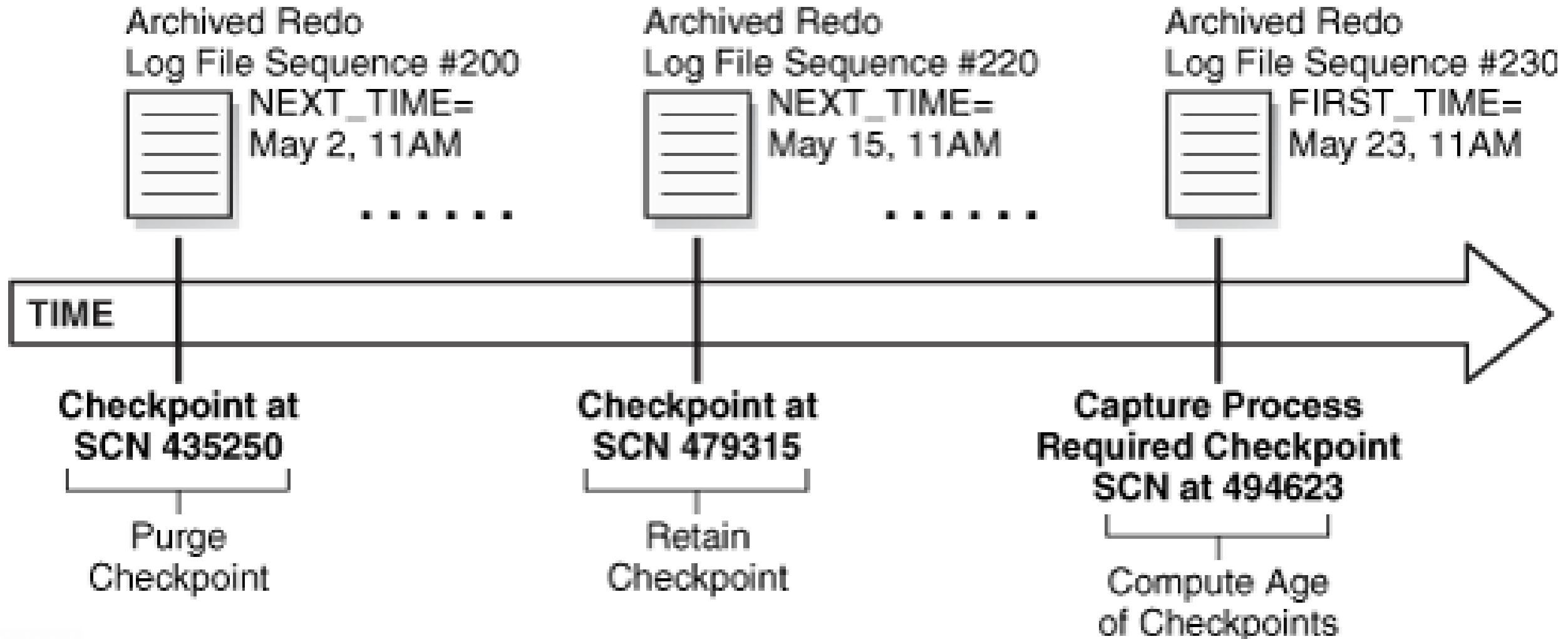
LE SCN EST UTILISE POUR :

- Recovery
- Data Guard sync
- Flashback

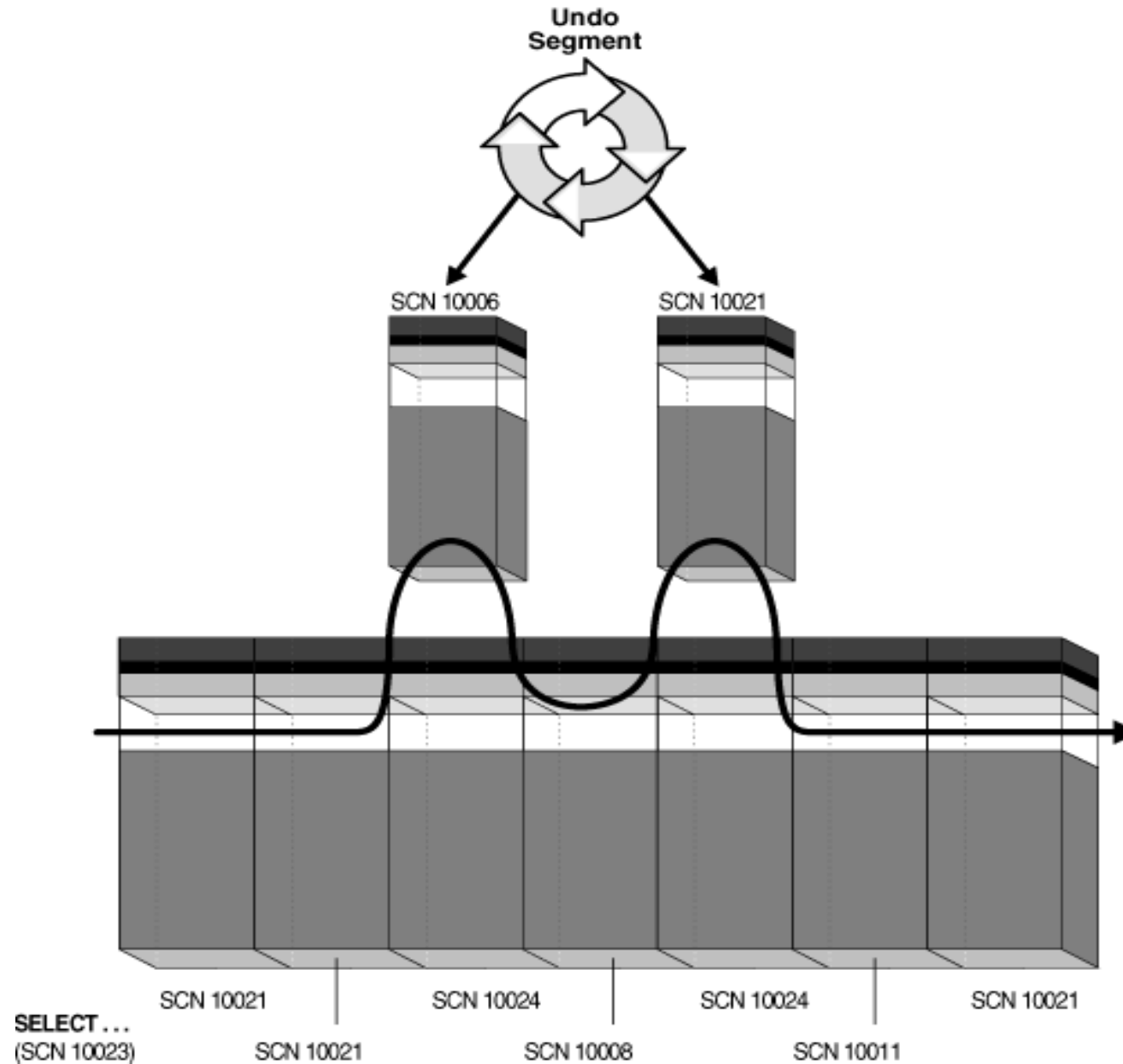
“SCN, c’est la ligne temporelle de la vérité Oracle.”



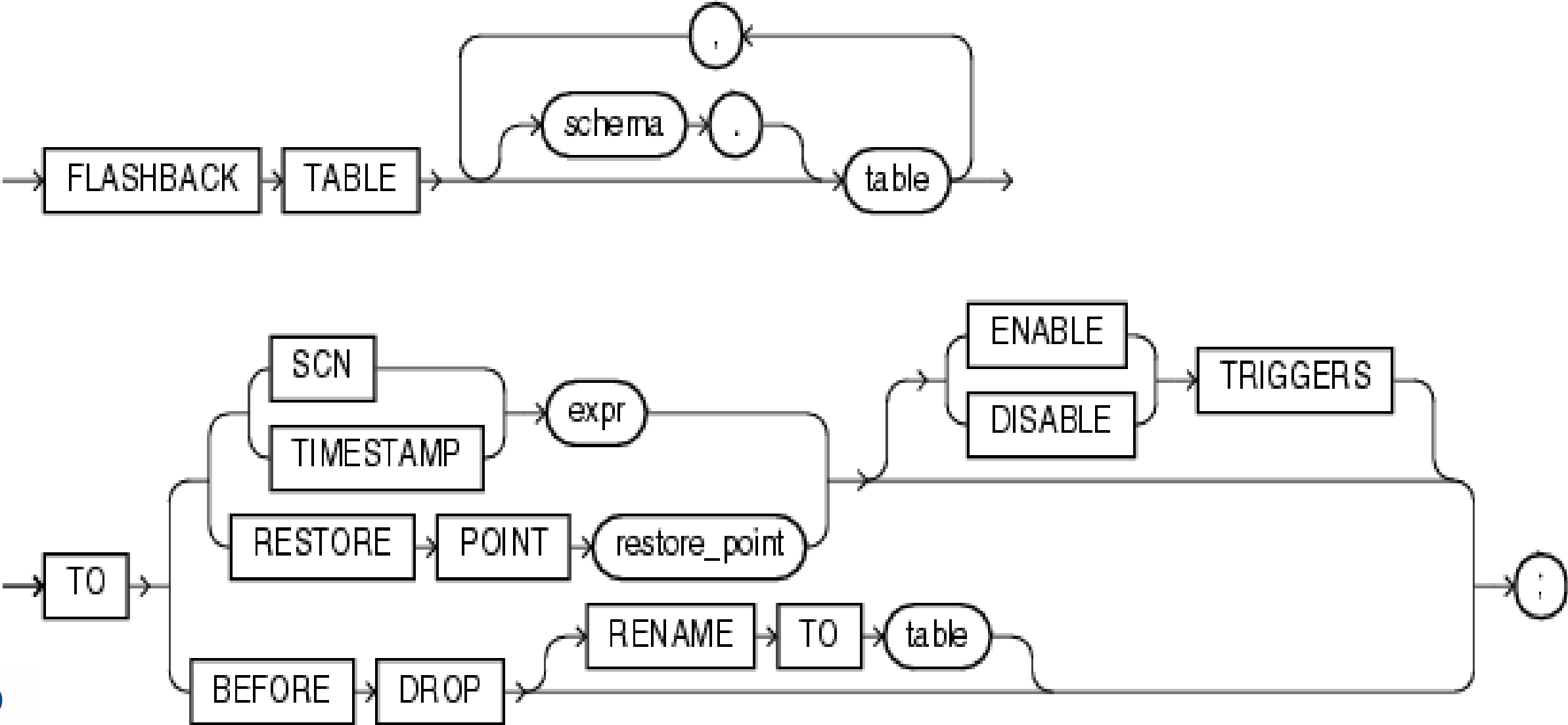
SCN = horloge logique globale d'Oracle



GESTION CHRONOLOGIQUE DES UNDO



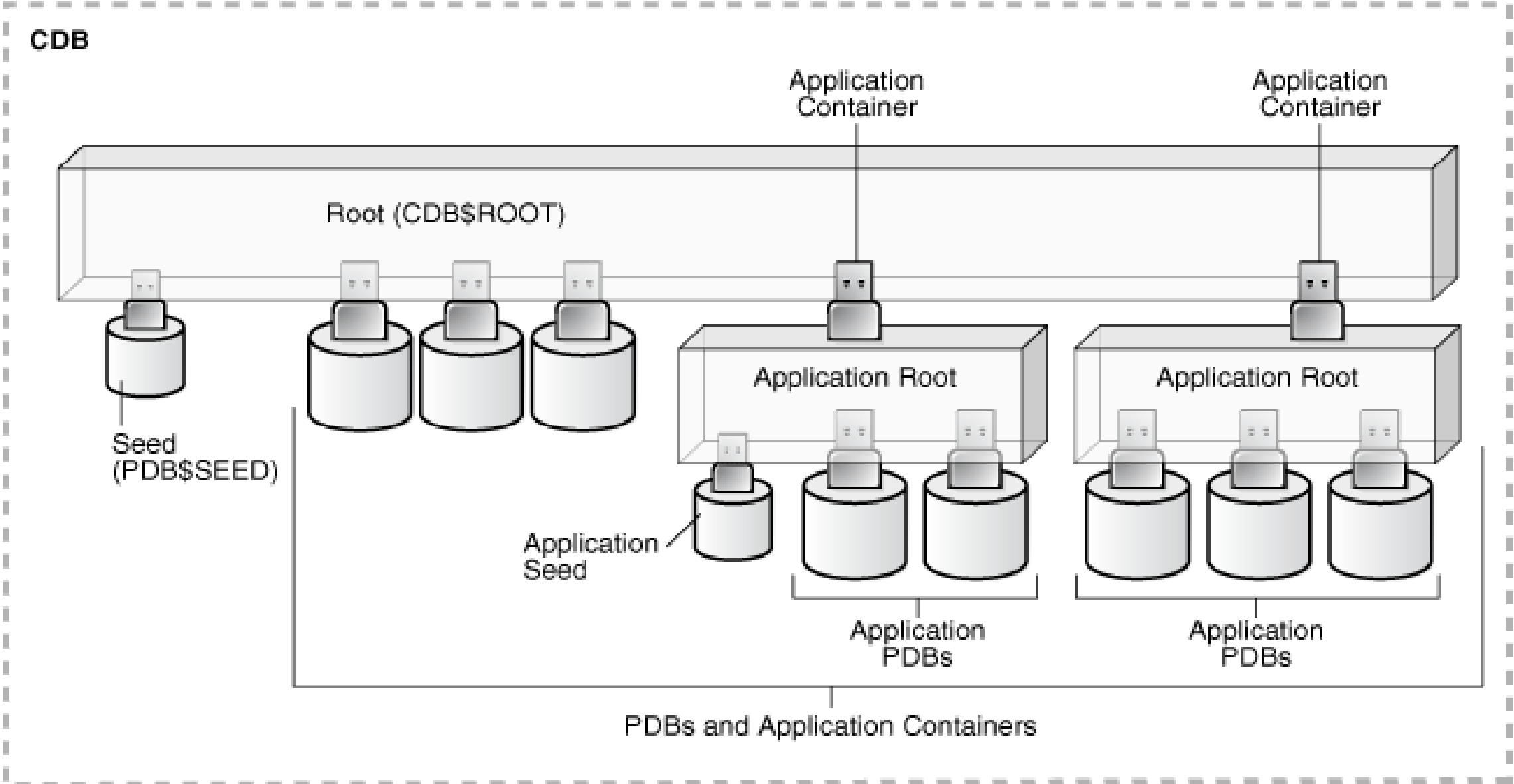
ORCHESTRATION SELON LE SCN D'ORACLE



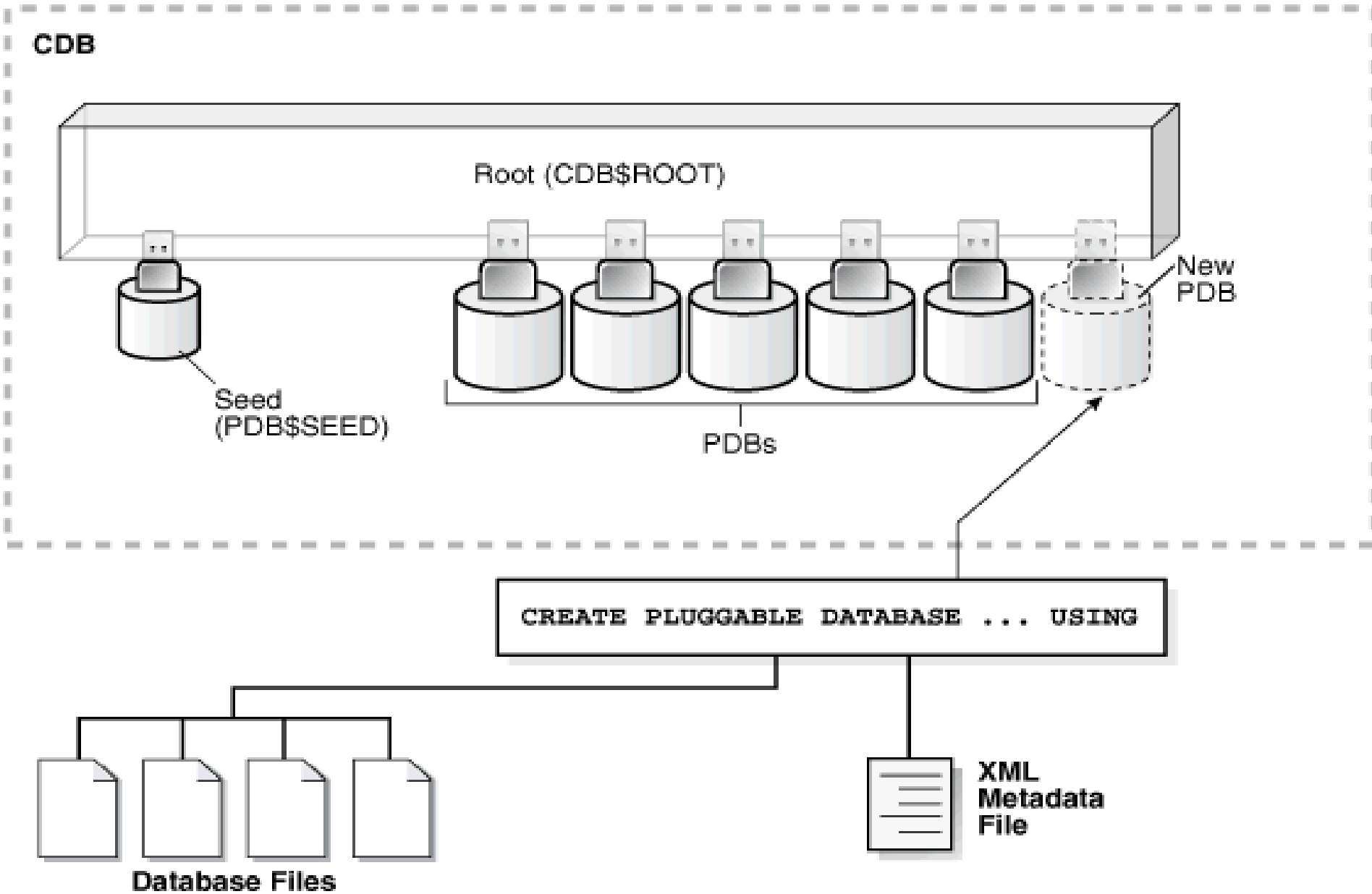
6. Multitenant Architecture (CDB / PDB)



ARCHITECTURE CDB / PDB



CDB GENERAL FLOW



Multitenant Architecture (CDB / PDB)

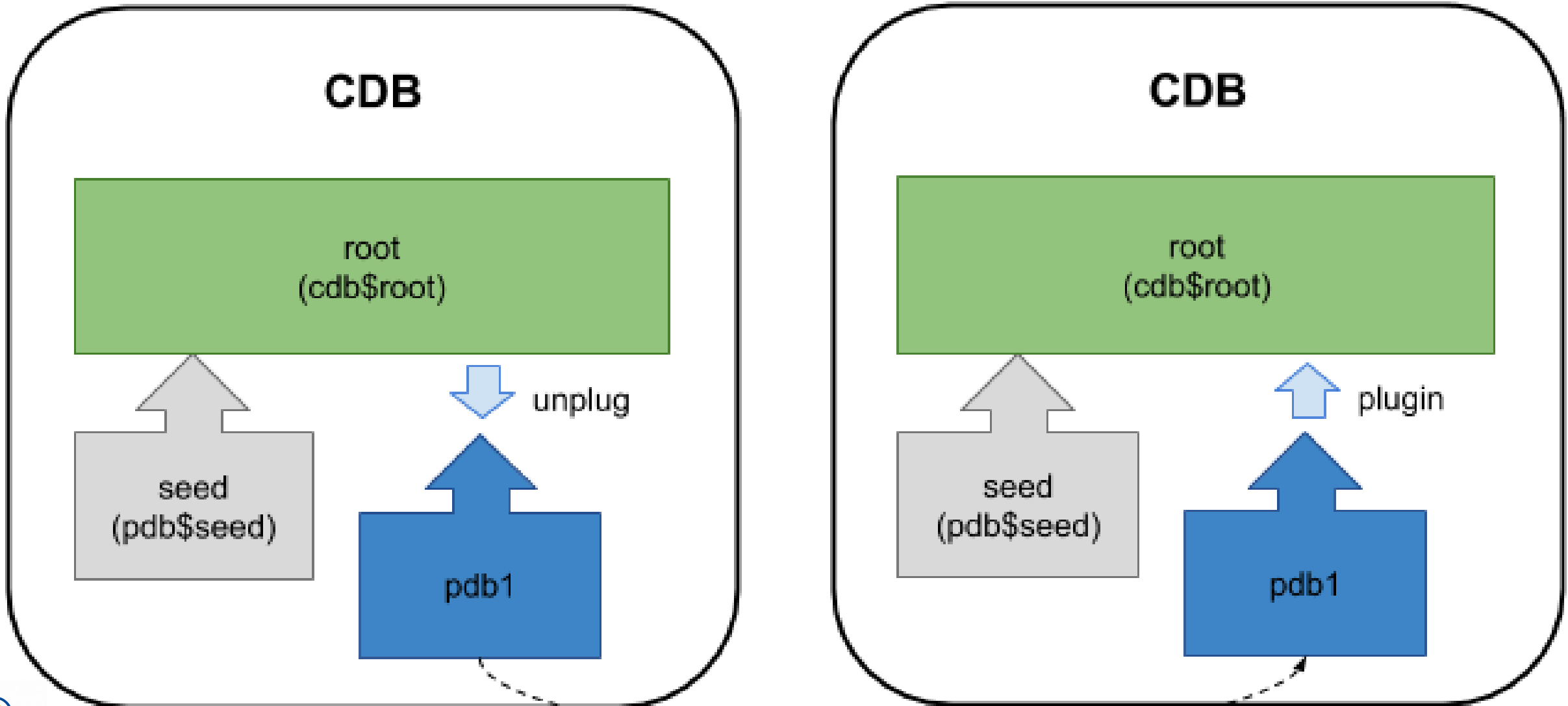
Élément	Description
CDB	Container principal
PDB	Bases "plugables" isolées

Avantages

- Consolidation
- Patch unique
- Clone rapide



CDB ROOT – DAISY CHAIN



GESTION D'INCIDENTS

Incident réel

Symptôme : Une PDB lente impacte toutes les autres

Cause : Pas de Resource Manager configuré



7. Exemple de Script “Santé Instance”



SAMPLE OF HEALTH CHECKING

```
-- Mémoire
SELECT component, current_size/1024/1024 MB
FROM v$sga_dynamic_components;

-- Sessions actives
SELECT COUNT(*) FROM v$session WHERE status='ACTIVE';

-- Top wait
SELECT event, total_waits, time_waited
FROM v$system_event
ORDER BY time_waited DESC FETCH FIRST 5 ROWS ONLY;

-- Redo size
SELECT group#, bytes/1024/1024 MB FROM v$log;
```

En 2 minutes je sais si le problème vient de la mémoire, de l'I/O ou des requêtes."



AU FINAL

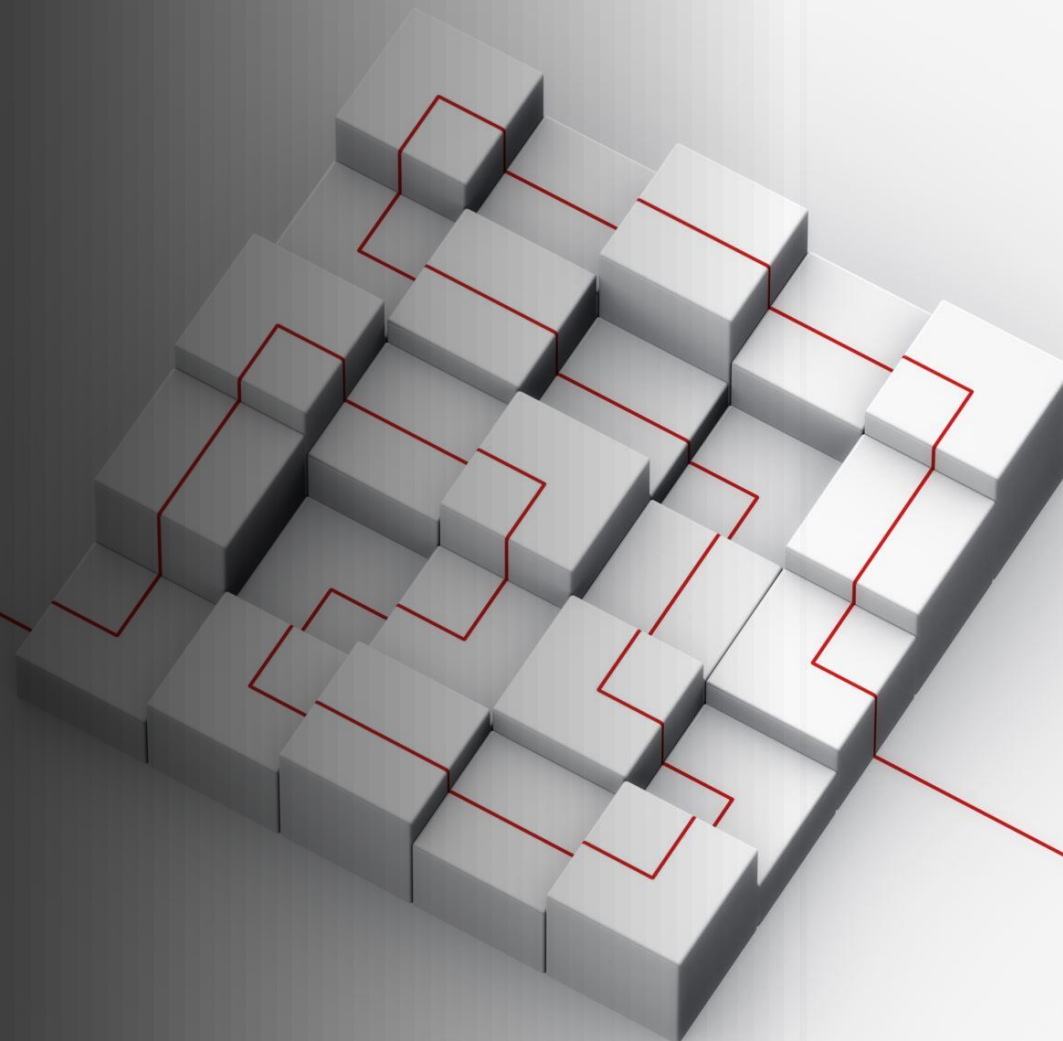
- ***“Un DBA Oracle doit comprendre le moteur comme un mécanicien comprend un moteur d’avion. Sans ça, on ne fait que redémarrer des bases... on ne résout pas les causes.”***





2

Installation & Architecture d'Infrastructure



2 - AGENDA GESTION INFRASTRUCTURE

- 1. Le vrai goulot d'étranglement : les I/O
- 2. Datafiles, Redo, FRA
- 3. ASM (Automatic Storage Management)
- 4. Latence disque : chiffres réels
- 5. RAID & Striping
- 6. Virtualisation vs Bare Metal vs Cloud
- 7. Taille des Redo Logs
- 8. Monitoring I/O — Scripts utiles
- 9. Erreurs d'architecture qui coûtent cher



- Choix OS / Filesystem / ASM
- Architecture de stockage (IOPS, latence, striping)
- CPU / RAM sizing
- Oracle Restart vs Clusterware
- Oracle sur VM vs Bare Metal vs Cloud (OCI/AWS/Azure)
- Bonnes pratiques de layout (DATA / FRA / REDO)



1. Le vrai goulot d'étranglement : les I/O



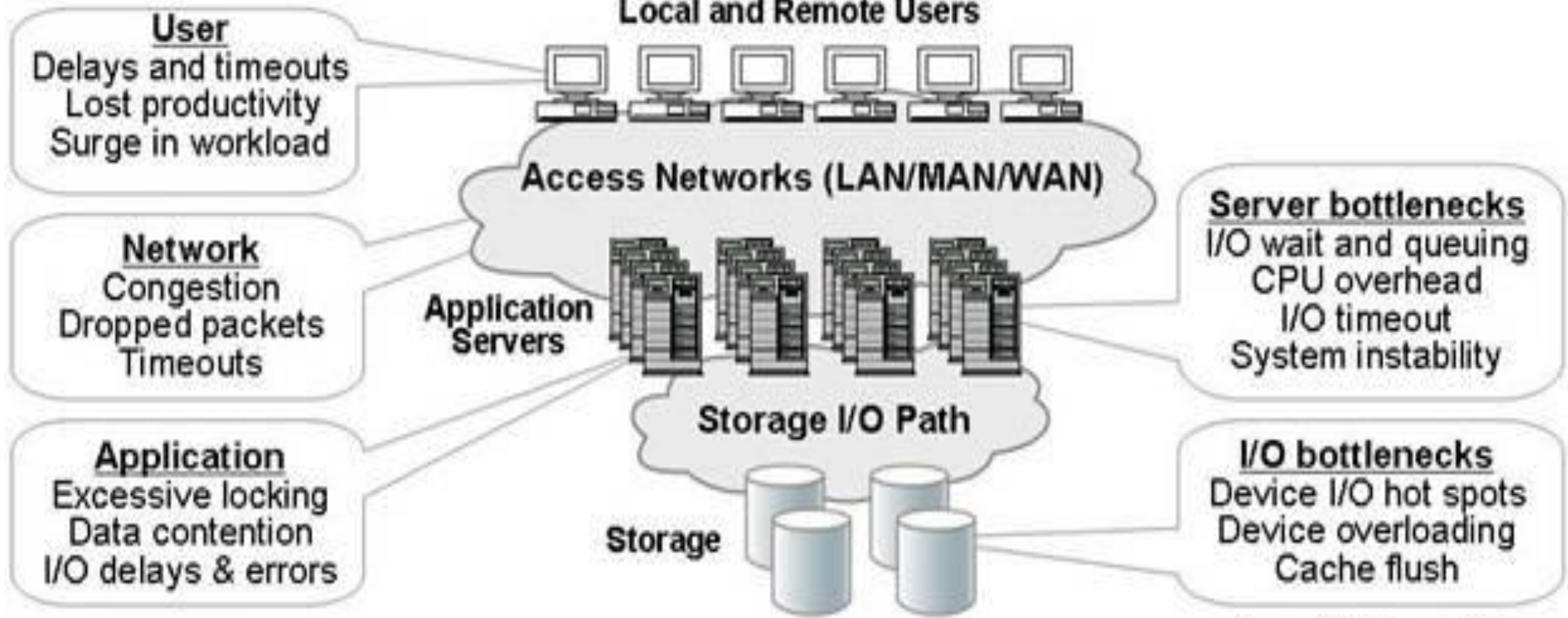
CONCEPTS CLES

Terme	Signification	Impact Oracle
IOPS	Nb d'opérations/s	Transactions
Throughput	Débit MB/s	Full scans
Latency	Temps réponse I/O	Commit, index lookup

« Oracle attend rarement le CPU. Il attend le disque. »



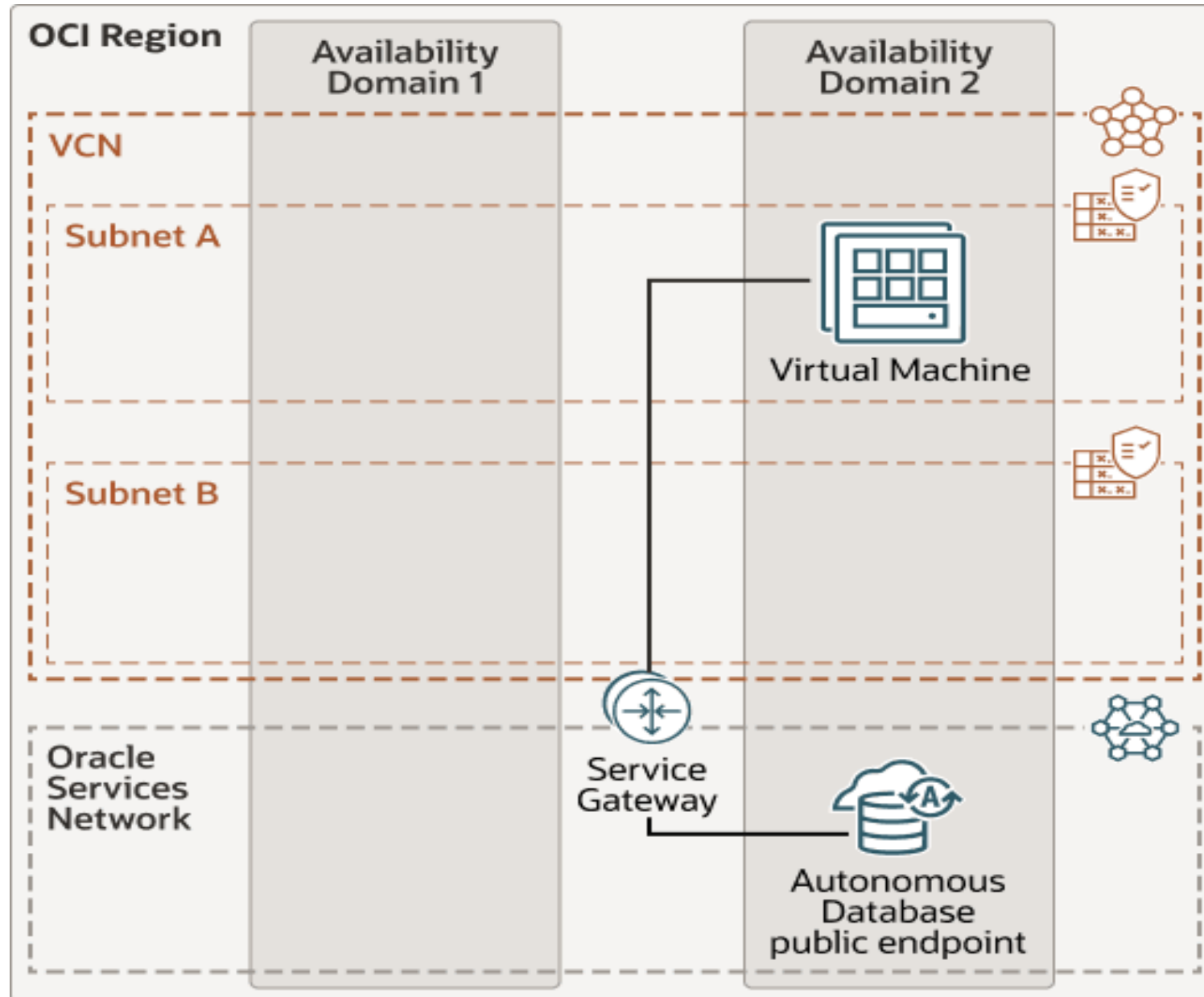
Storage I/O : The Bottleneck



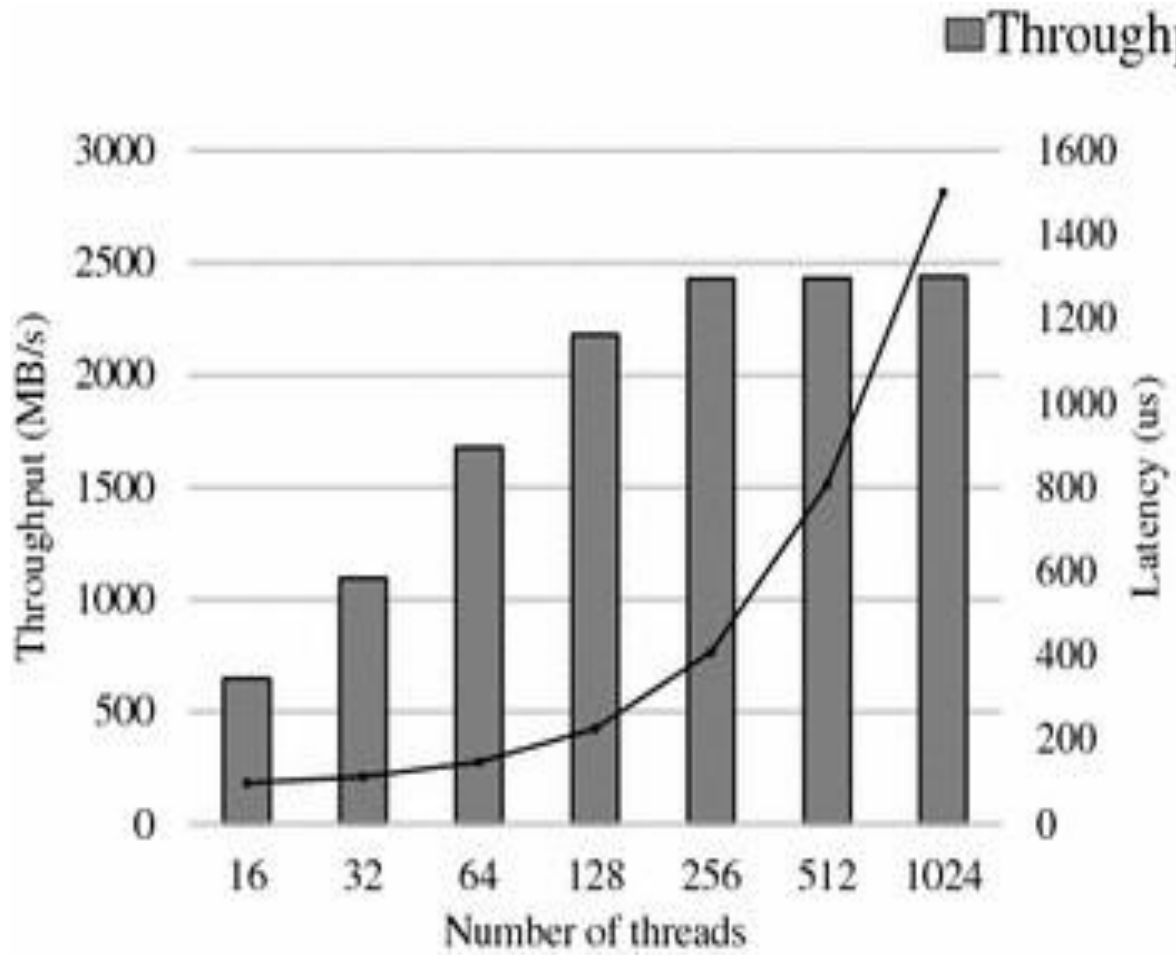
Source: The StorageIO Group



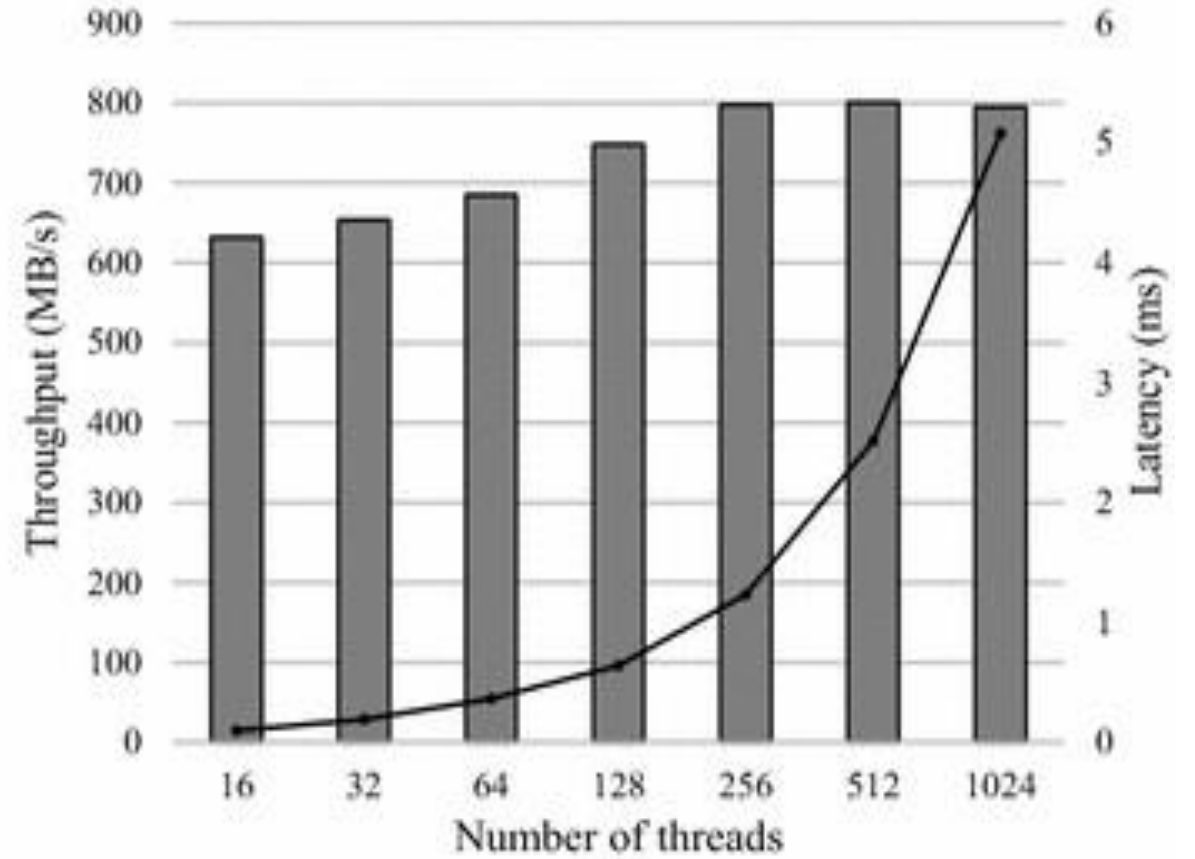
Virtual Machine & Service Gateway



I/O Throughput & Latency



(a)

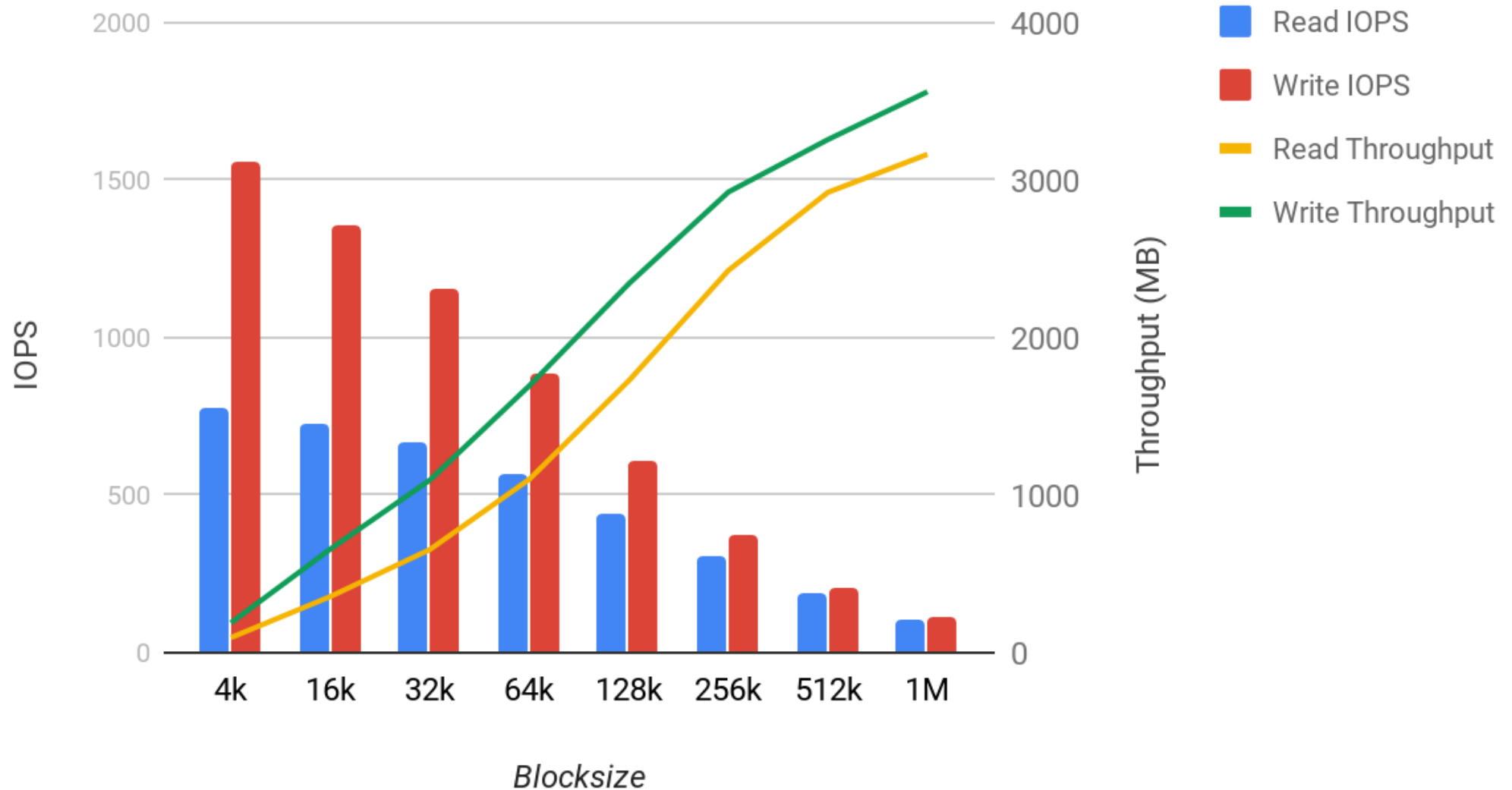


(b)



Disk Performance Analysis

Disk perf vs block size (1TB STD-PD, 32vCPU)



2. Datafiles, Redo, FRA



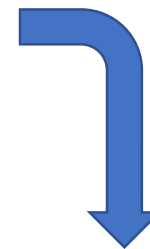
Principes de base

Zone	Charge I/O	Type d'accès
Datafiles	Aléatoire	Lecture/écriture
Redo Logs	Séquentiel	Ultra critique
FRA	Séquentiel	Archives/backups

🔥 Incident réel

Symptôme : Lenteur générale + pics de "log file sync"

Cause : Redo logs sur le même LUN que datafiles



Les redo doivent toujours être isolés sur du stockage à faible latence.

REDO LOG FILE MANAGEMENT

CONTROL FILE & REDO LOG FILE MANAGEMENT

The Unsung Pillars of Oracle Database Stability

CONTROL FILE

– The Brain

- Tracks the physical structure of the database (datafiles, redo logs, checkpoints)
- Guides the database during startup, recovery, and backup

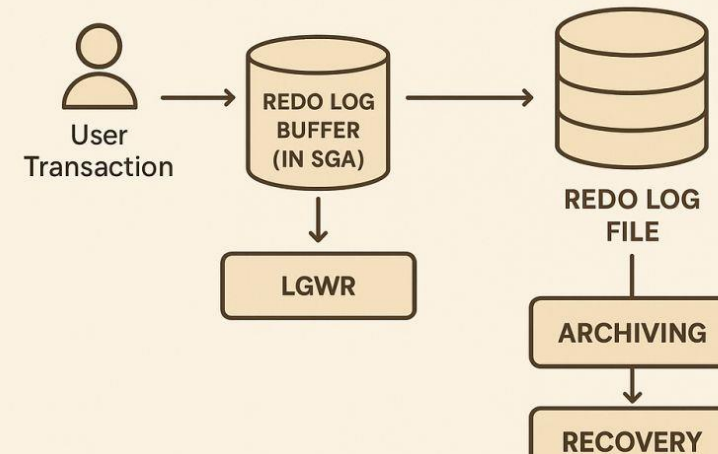
REDO LOG FILE

– The Memory

- Stores all changes made to the database
- Critical for instance and crash recovery

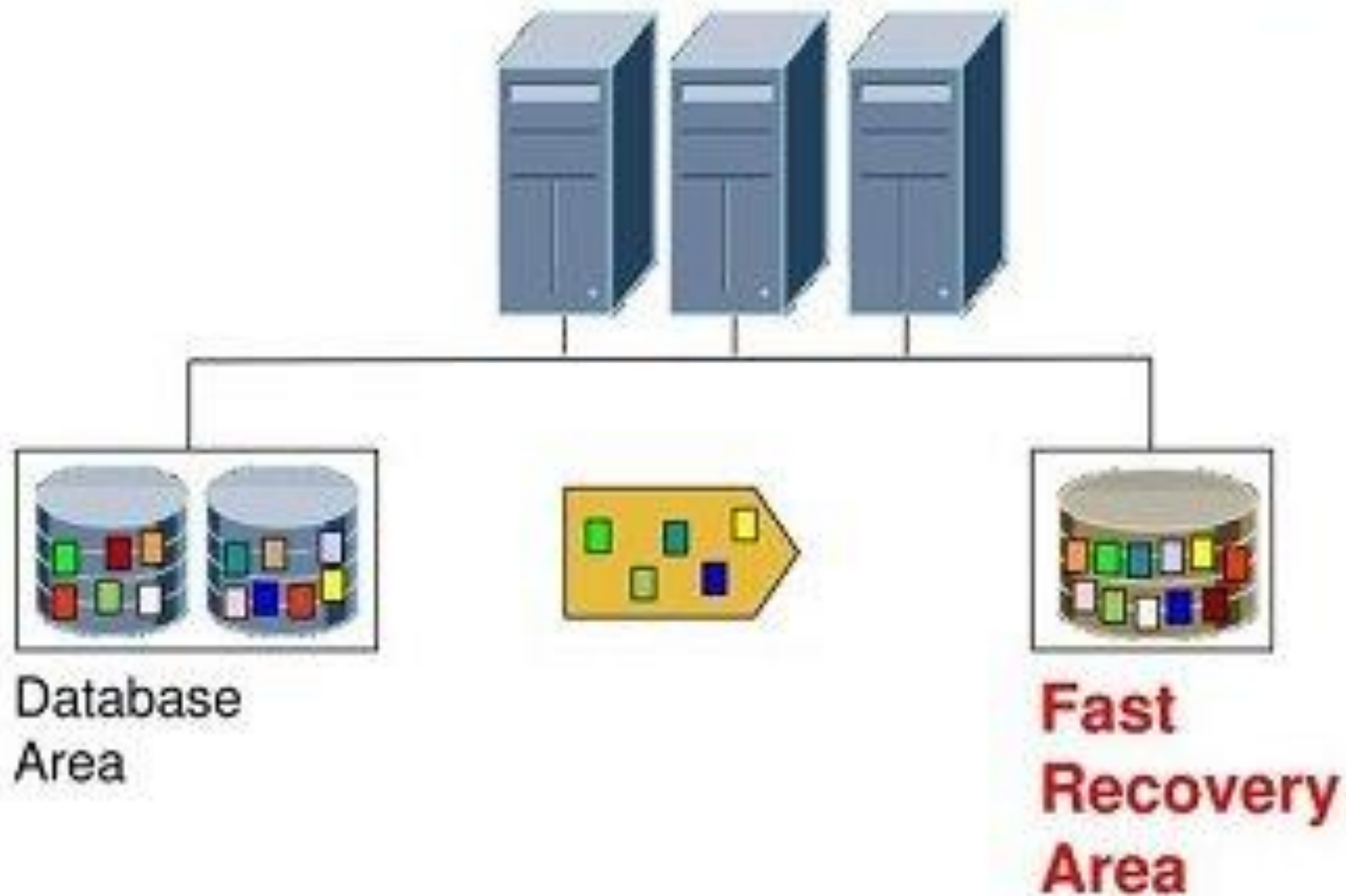


Pro Tip: Always keep multiple copies of control files on separate disks for fault tolerance

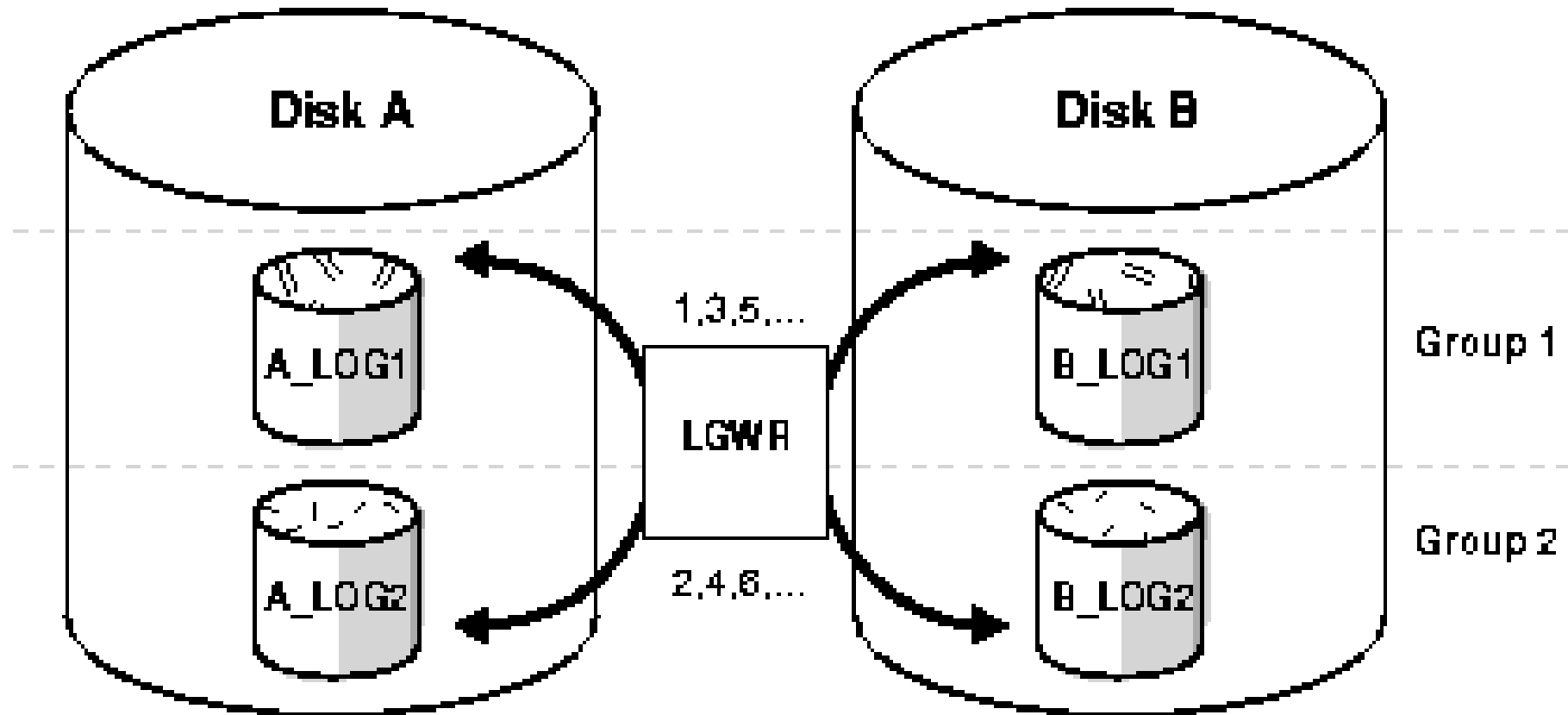




Fast Recovery Area (FRA)

Stores and manages all recovery-related files

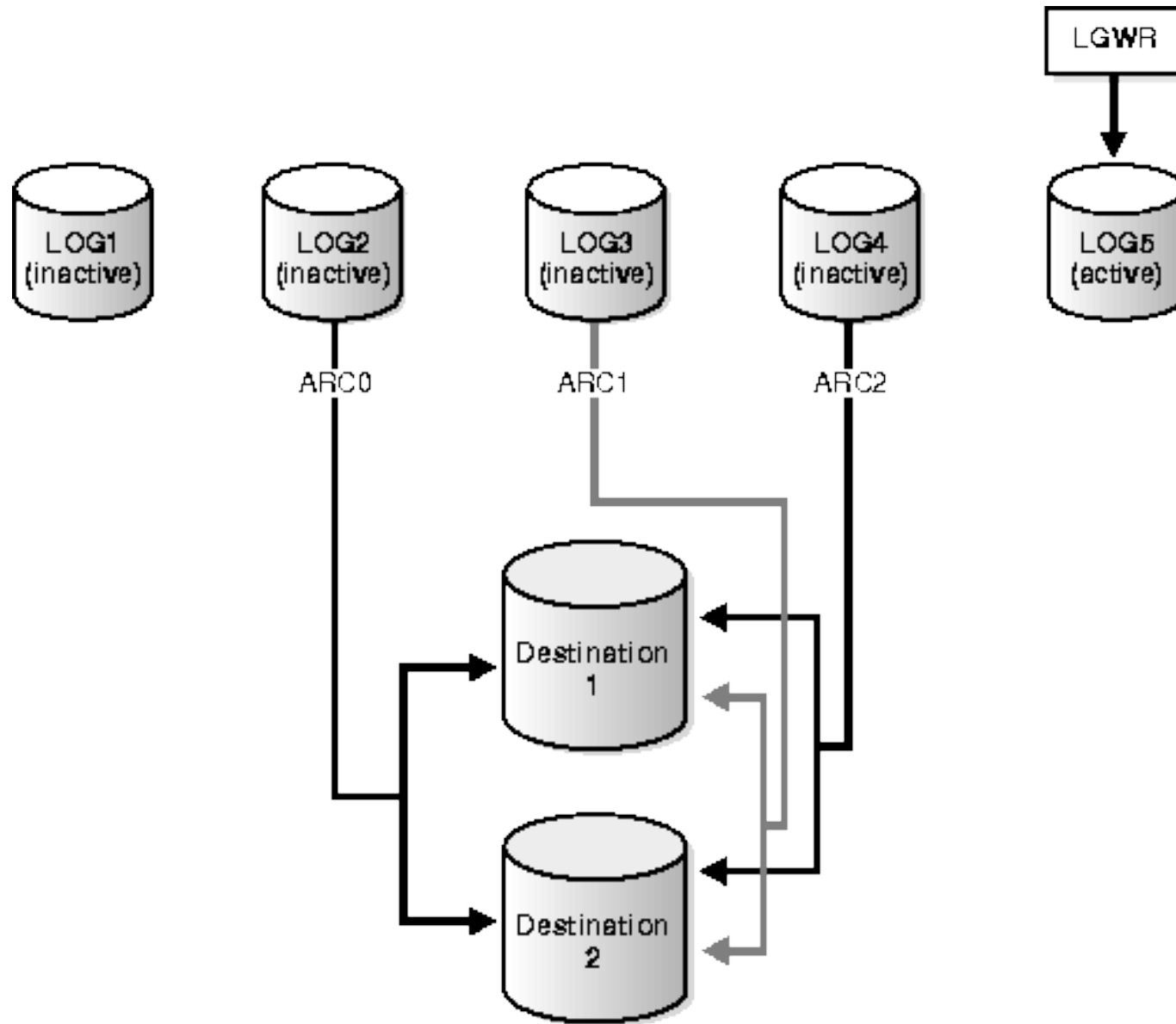


LGWR LOGGING



-  Group 1
-  Group 2

LGWR ARCHITECTURE

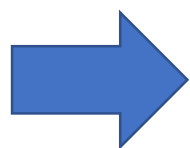


3. ASM (Automatic Storage Management)



Pourquoi ASM ?

- Striping automatique
- Mirroring intégré
- Répartition I/O
- Simplifie l'admin stockage



🔥 Incident réel

Erreur classique : Tout dans +DATA

Résultat : Saturation I/O invisible jusqu'à l'incident

Disk Groups typiques

Diskgroup

Contenu

DATA

Datafiles

RECO

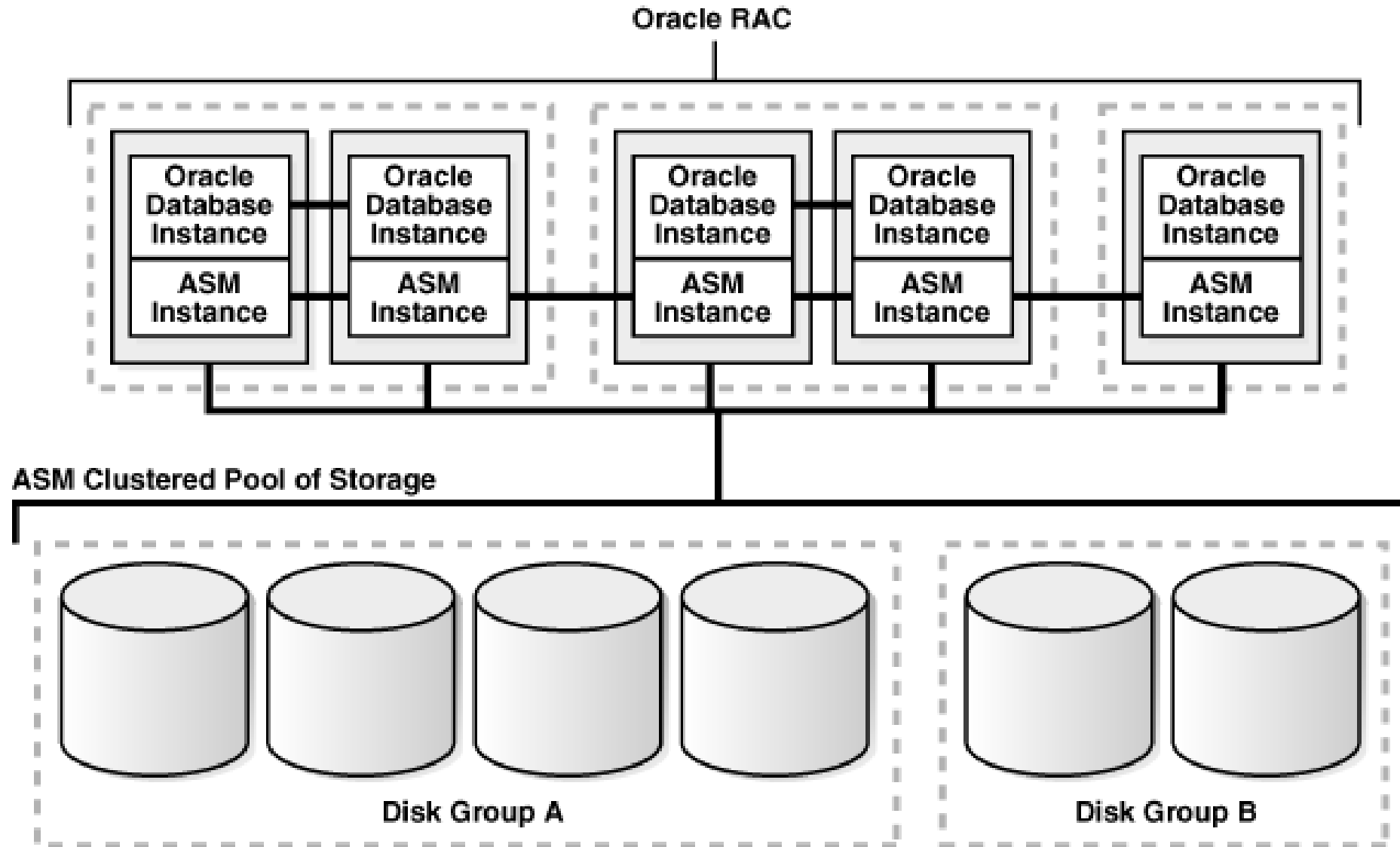
FRA

REDO

Redo logs (si critique)



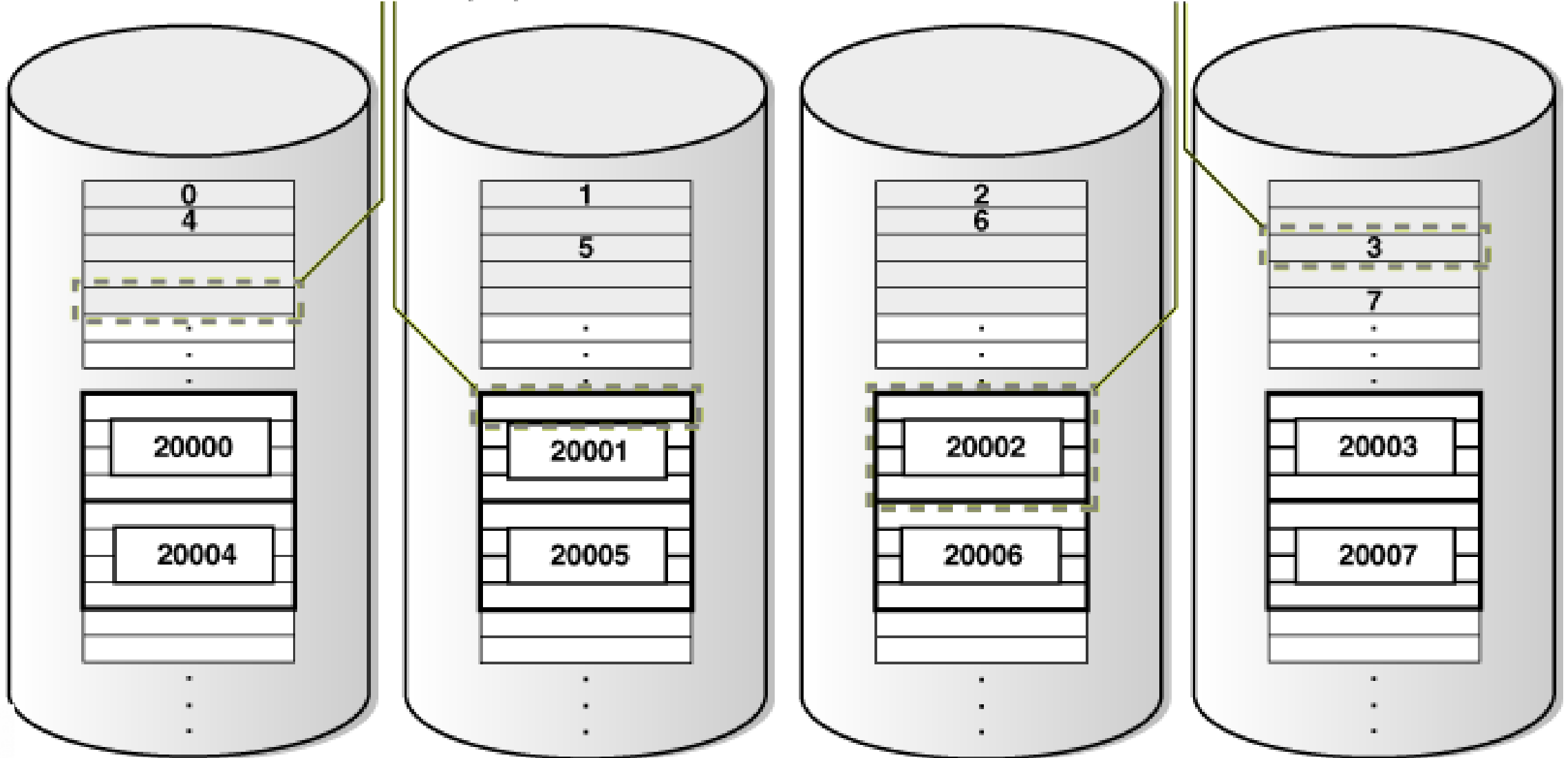
ORACLE RAC



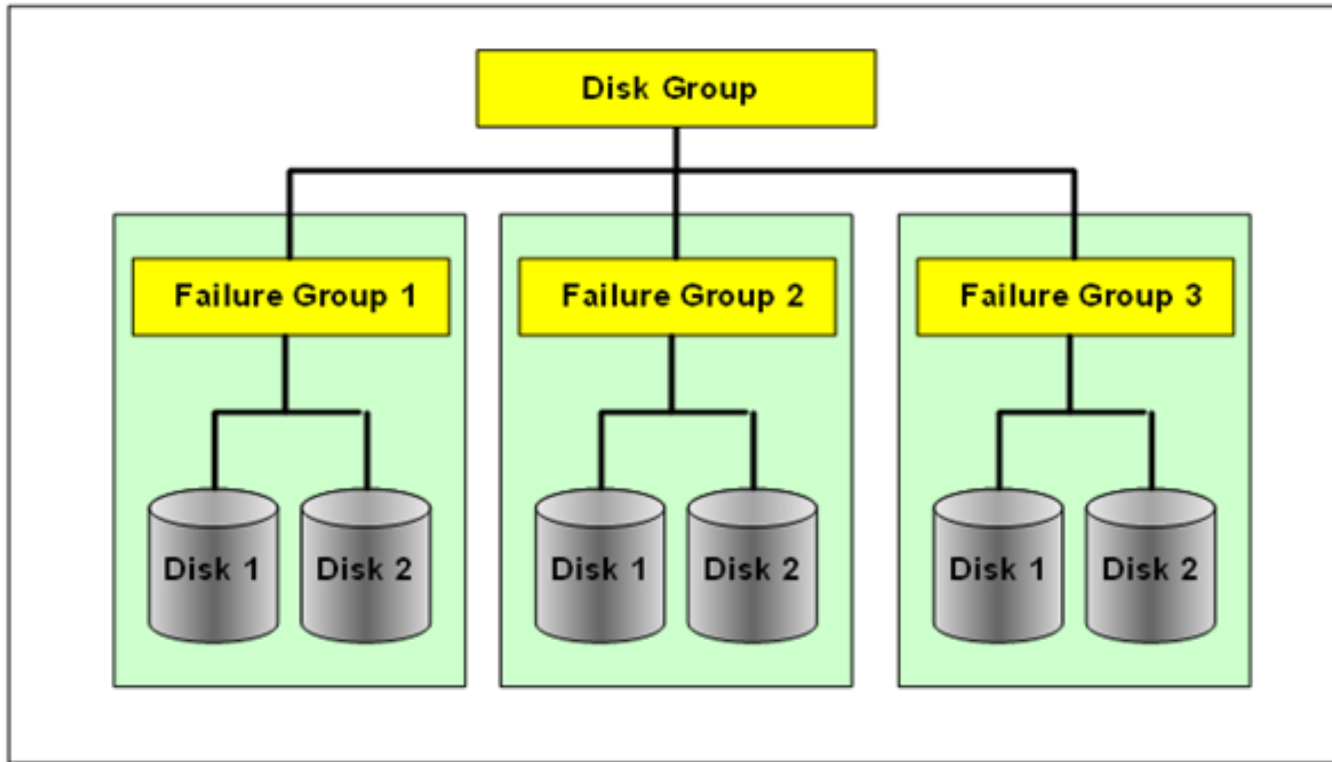
ALLOCATION UNIT PROCESS

Allocation Unit (AU)

Variable Size ASM File Extents

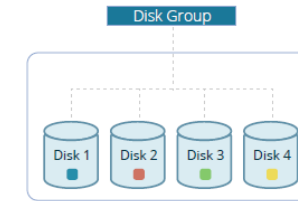


Disk Group Redundancy

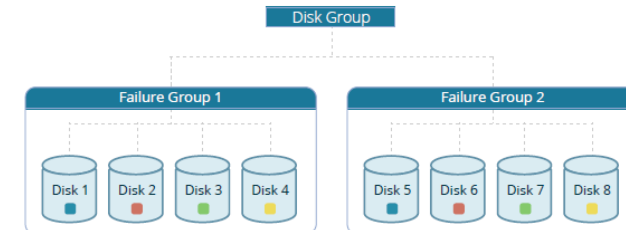


Striping and Mirroring Diagram

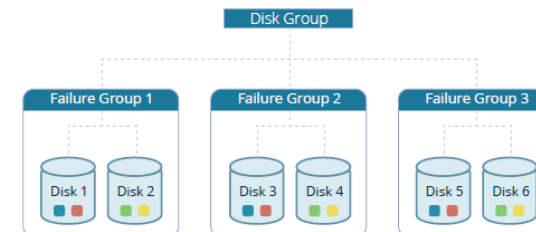
External Redundancy
No Mirroring



Normal Redundancy
2 Way Mirroring



High Redundancy
3 Way Mirroring



5. RAID & Striping

RAID TECHNOLOGY : THE NUMBERS

RAID

Usage Oracle

RAID 5

✘ Mauvais pour redo

RAID 10

✔ Idéal pour DB

ASM Normal Redundancy

✔ Alternative



DATABASE I/O ACCESS : THE RAID CHOICE

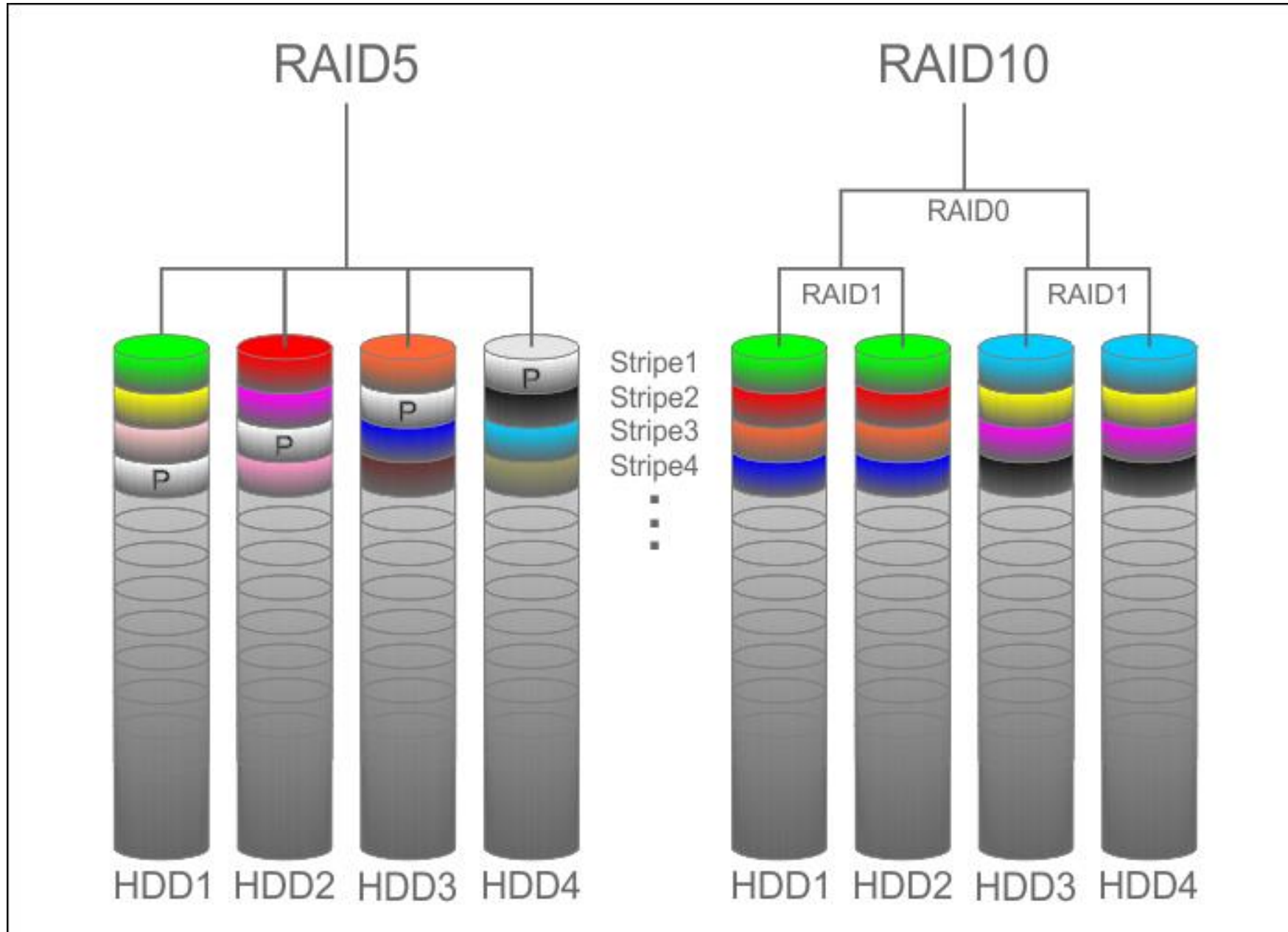
A Comparison Chart to Help to Decide Which RAID Level is Right for our Organization

This slide shows the difference between various RAID levels such as RAID 0, RAID 1, RAID 5, 6, 10, 50 and 60. It represents the number of minimum disks required by each RAID level and different levels of performance of each RAID type.

RAID Levels	RAID 0	RAID 1	RAID 5	RAID 6	RAID 10	RAID 50	RAID 60
Description	Striping	Mirroring	Striping with Parity	Striping with double parity	Mirroring and striping	Striping and distributed parity	Striping and double parity
Minimum Disks	2	2	3	4	4	6	8
Read Performance	High	High	High	High	High	High	High
Write Performance	High	Medium	High	High	Medium	Medium	Medium
Cost	Low	High	Low	Low	High	Medium	High
Data Protection	No	Yes	Yes	Yes	Yes	Yes	Yes
Capacity Utilization %	1	0.5	67%-94%	50%-80%	0.5	67%-94%	50%-88%
Common Implementation	Live streaming, video editing	OS, database operations	Information warehousing	Financial and accounting applications, database servers	Fast databases, application servers	Large databases, file and application servers	Servers with large capacity requirements



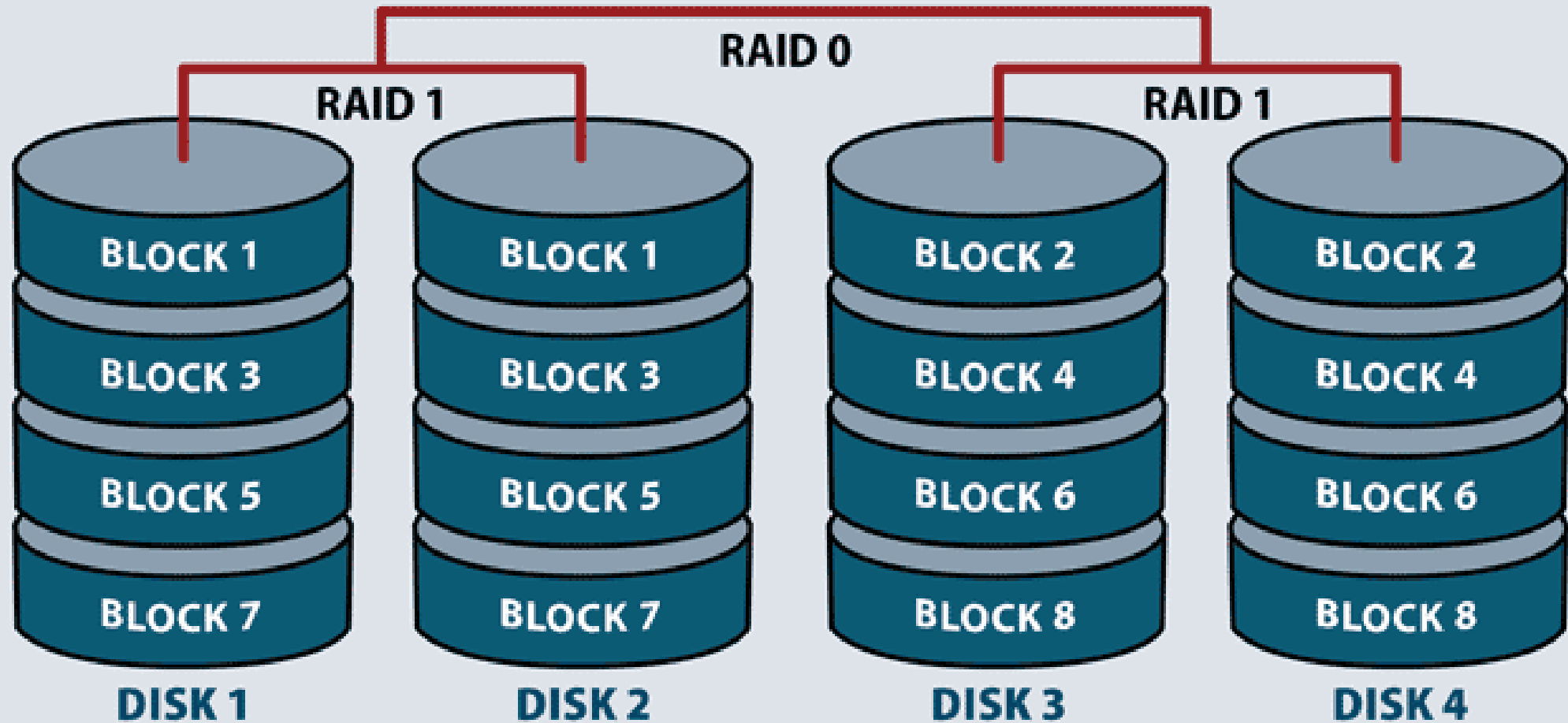
RAID5 OR RAID10



RAID10 TECHNOLOGY FOR ORACLE

RAID 10

Disk stripping and mirroring



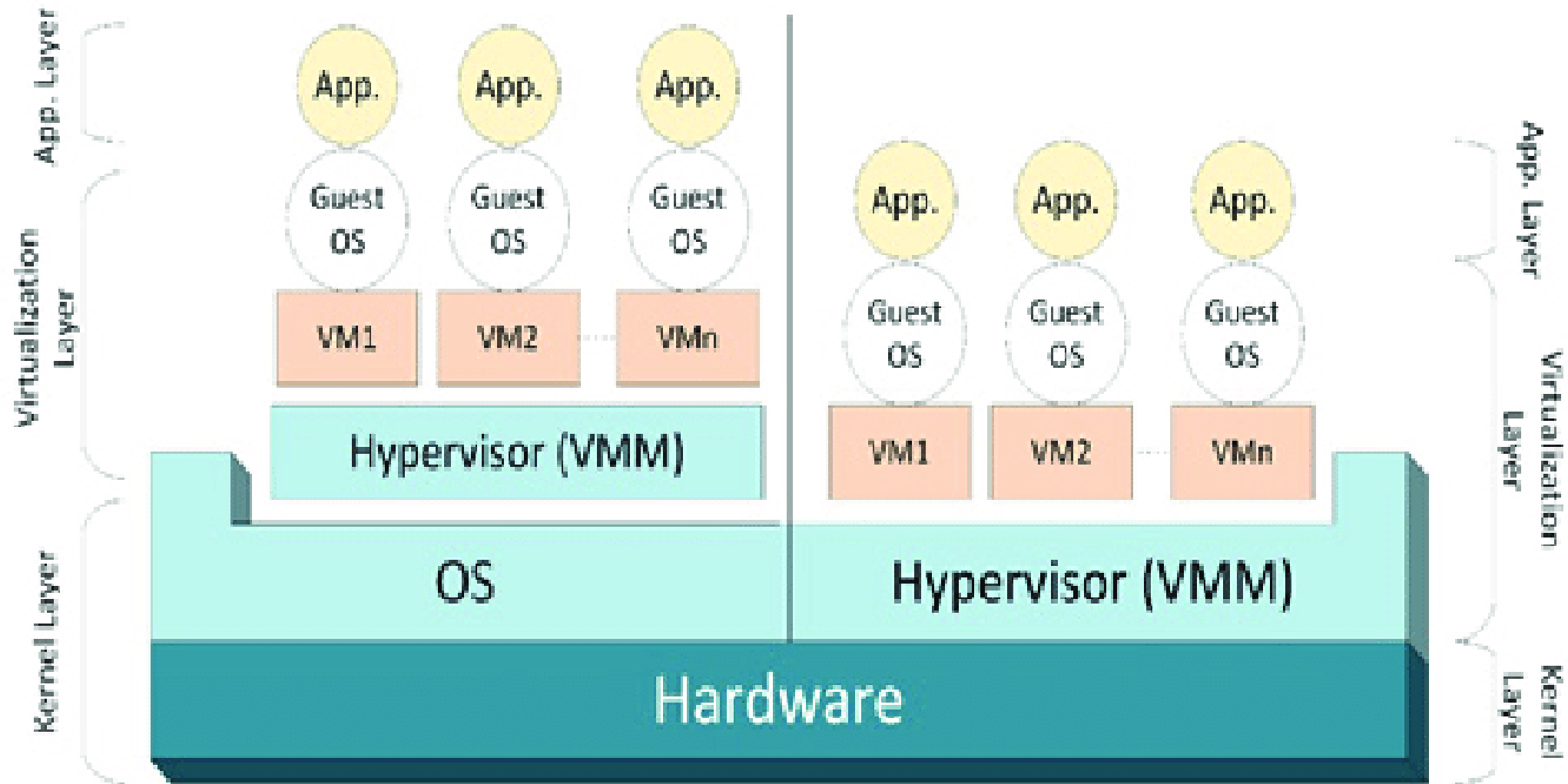
6. Virtualisation vs Bare Metal vs Cloud



DATABASES VIRTUALIZATION

Infra	Avantages	Risques
VM	Flexibilité	Overcommit I/O
Bare Metal	Perf stable	Moins flexible
Cloud	Scalabilité	Latence variable

VIRTUALIZATION OVER CLOUD

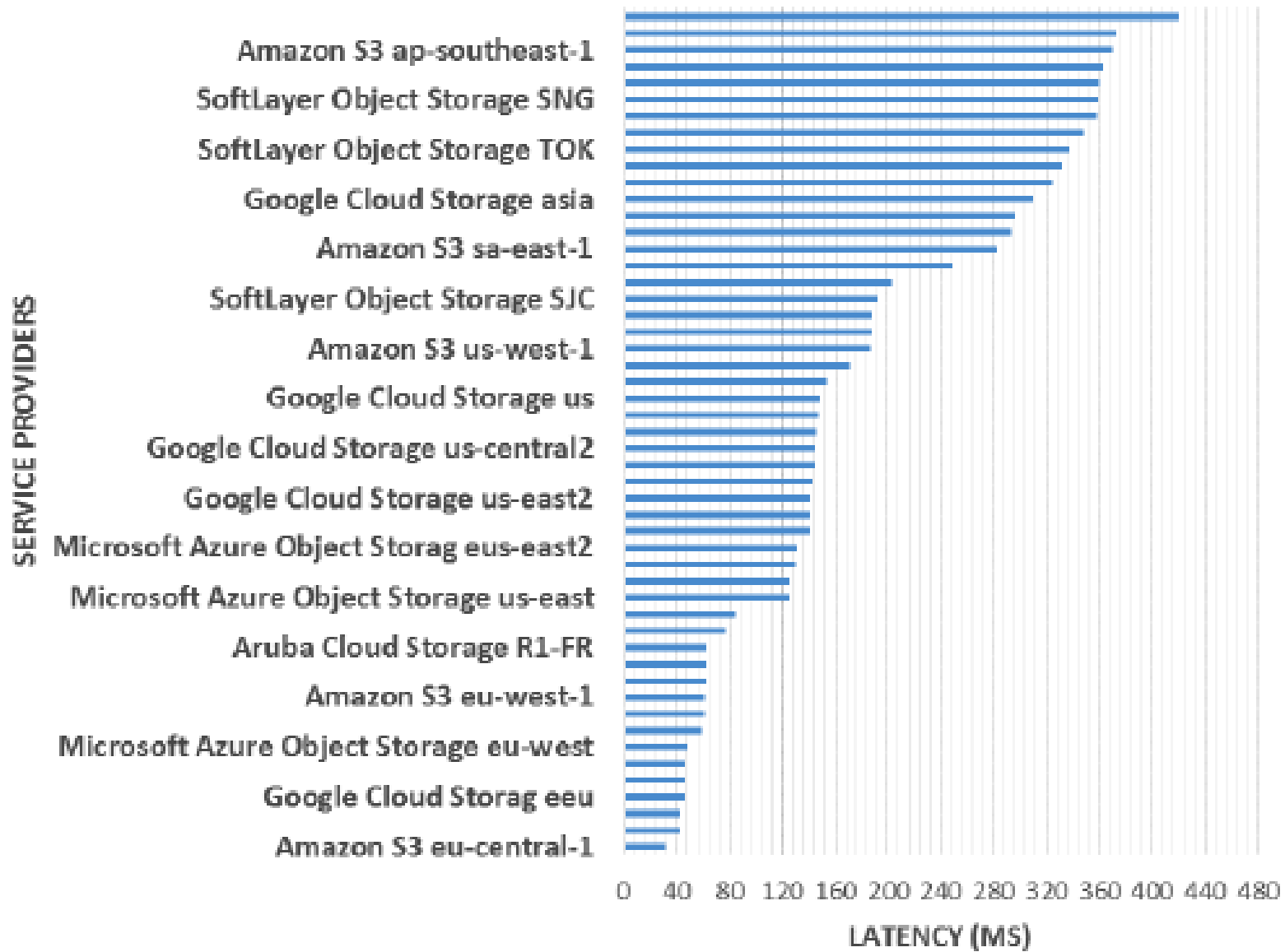


a) Hosted Architecture

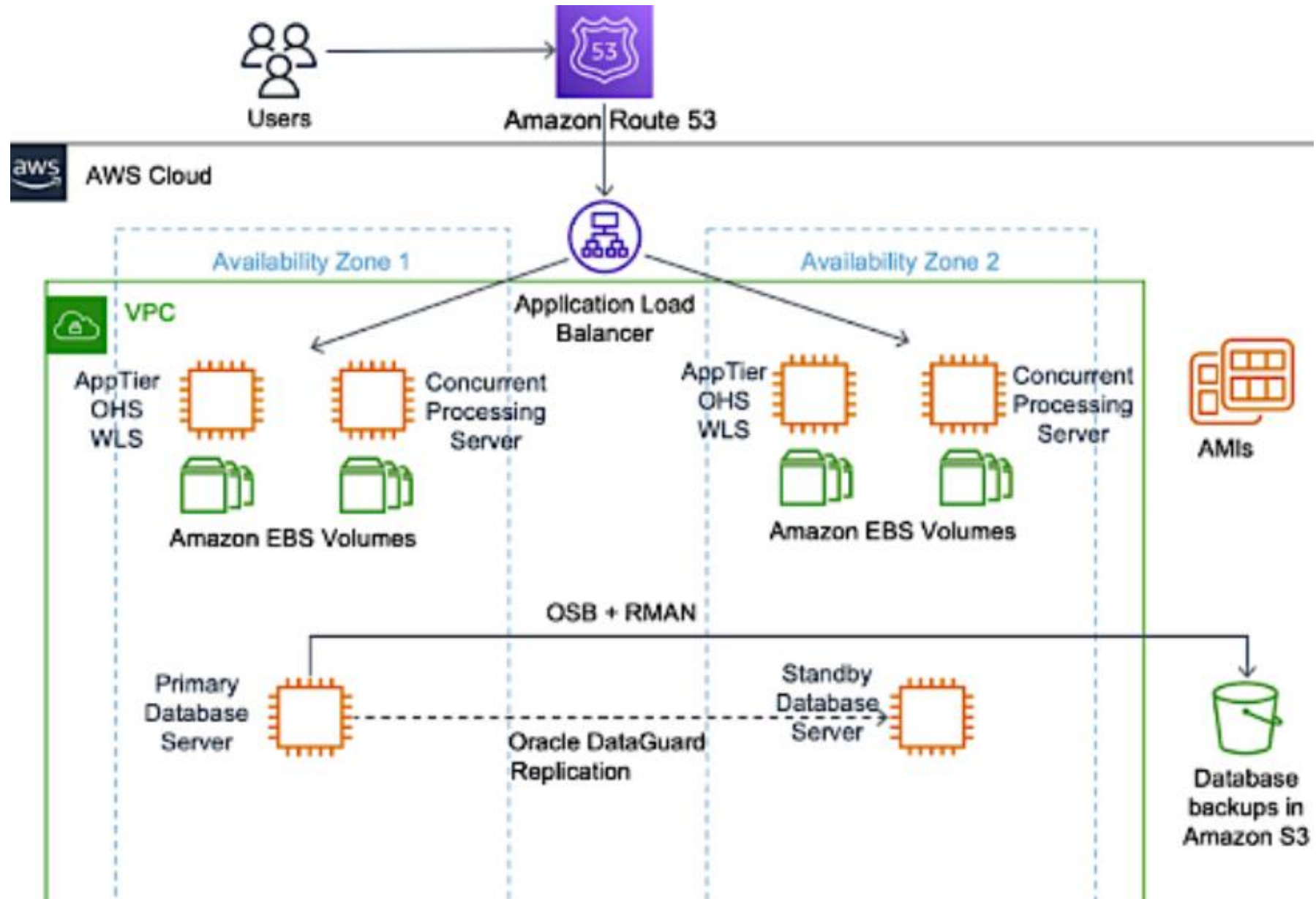
b) Bare-Metal Architecture



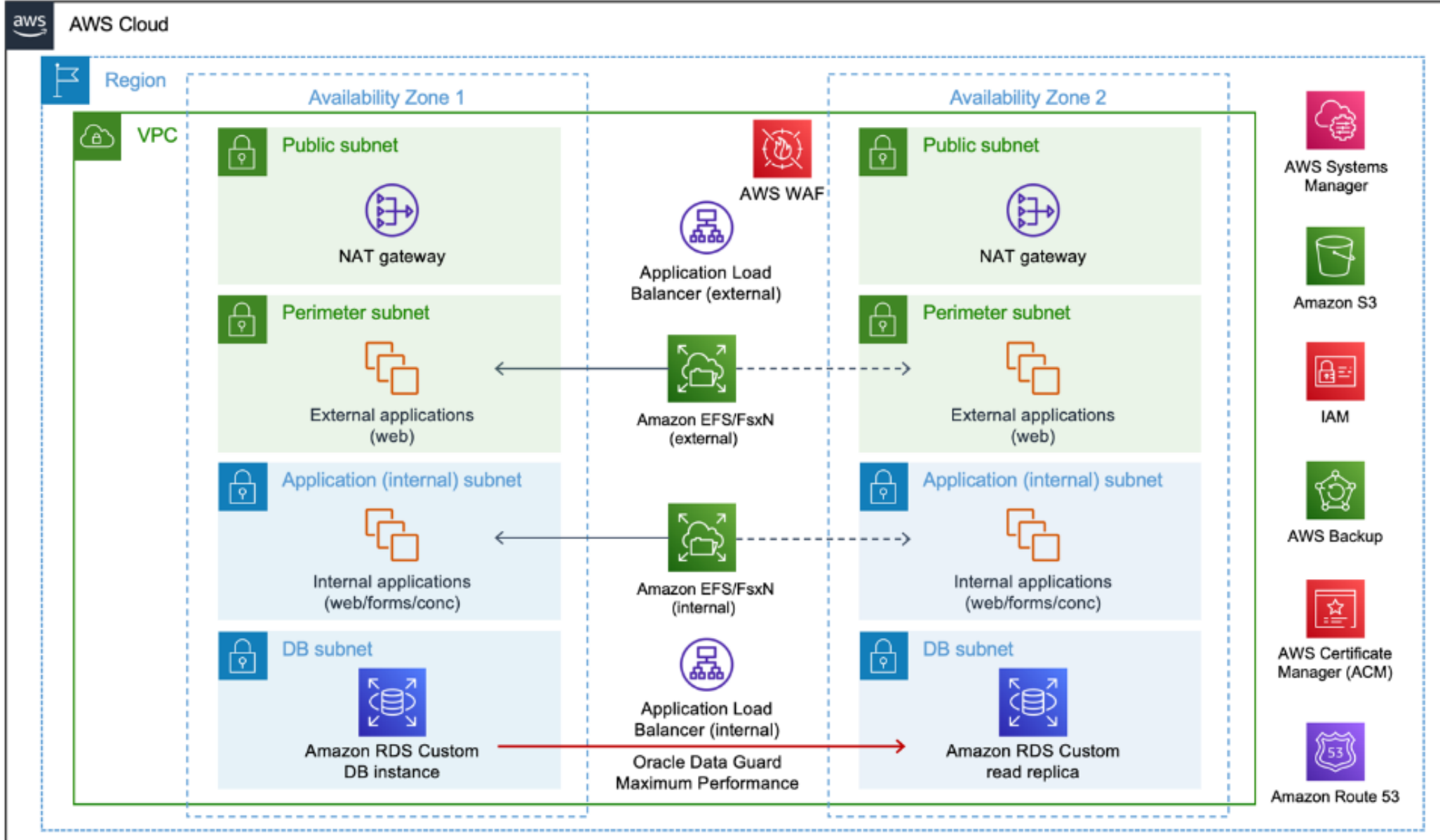
CLOUD COMPARISON



AWS - ROUTE 53



AWS - CLOUD - VPC



RISK OVER UNBALANCER I/O

🔥 Incident réel

Symptôme : Perf aléatoire

Cause : VM partagée avec autre workload bruyant

7. Taille des Redo Logs



Taille des Redo Logs

Mauvaise config

Bonne pratique

Switch toutes les 2 min

15–30 min

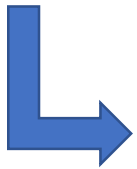
Trop petits

I/O fréquent

Trop gros

Recovery long

Diagnostic



```
SELECT group#, sequence#, bytes/1024/1024 MB, archived, status  
FROM v$log;
```



8. Monitoring I/O — Scripts utiles



Scripts Utiles

« Quand je vois un problème, je sais si c'est Oracle... ou le stockage »

```
-- Latence I/O
SELECT event, time_waited/100 time_waited_ms
FROM v$system_event
WHERE event LIKE 'db file%read';
```

```
-- Redo write waits
SELECT event, total_waits, time_waited
FROM v$system_event
WHERE event='log file sync';
```

```
-- Datafile I/O
SELECT file#, phynds, phywrts
FROM v$filestat;
```



Les Meilleurs scripts pour Oracle

- 1) Top événements d'attente (instance)
- 2) Events d'attente "non-idle" (version-friendly)
- 3) Wait classes (vue macro)
- 4) Top sessions qui attendent maintenant
- 5) Blocking sessions (qui bloque qui)
- 6) Chaîne de verrous (TX) : bloqueur / bloqué + objet
- 7) Top SQL par "elapsed time"
- 8) Top SQL par "buffer gets" (consommation CPU logique)
- 9) Top SQL par "disk reads" (I/O physique)
- 10) SQL text d'un SQL_ID



Les Meilleurs scripts pour Oracle

- 11) Plan d'exécution "réel" (cursor) via DBMS_XPLAN
- 12) Deltas de redo : "log file sync" / commits (approche commit)
- 13) Volume de redo / taille générée (instance)
- 14) "Hot files" I/O (datafiles)
- 15) "Hot objects" (segments) via v\$segment_statistics
- 16) Buffer cache : objets qui polluent (top cached blocks)
- 17) PGA / sorts : "workarea" et overflows
- 18) TEMP : qui consomme maintenant
- 19) Library cache / hard parses
- 20) Index usage "suspects" (par taille vs activity)



Scripts for Oracle

savoir “où Oracle attend” (I/O, verrous, CPU, réseau...).

```
-- Top waits (instance) - cumulé depuis le démarrage
SELECT
  event,
  total_waits,
  time_waited,
  ROUND(time_waited/100, 2) AS time_waited_s,
  average_wait
FROM v$system_event
WHERE event NOT LIKE 'SQL*Net%'
      AND event NOT LIKE 'rdbms ipc%'
      AND event NOT LIKE 'pmon timer%'
      AND event NOT LIKE 'smon timer%'
ORDER BY time_waited DESC
FETCH FIRST 20 ROWS ONLY;
```

enlever les bruits “idle” proprement via v\$event_name

```
-- Non-idle waits (plus propre)
SELECT
  se.event,
  se.total_waits,
  ROUND(se.time_waited/100,2) AS time_waited_s
FROM v$system_event se
JOIN v$event_name en ON en.name = se.event
WHERE en.wait_class <> 'Idle'
ORDER BY se.time_waited DESC
FETCH FIRST 20 ROWS ONLY;
```

savoir si le “problème” est I/O, concurrency, commit, network

```
SELECT
  wait_class,
  ROUND(time_waited/100,2) AS time_waited_s
FROM v$system_wait_class
WHERE wait_class <> 'Idle'
ORDER BY time_waited DESC;
```

qui est bloqué / lent “en live”.

```
SELECT
  s.sid, s.serial#, s.username, s.status,
  s.event, s.wait_class, s.seconds_in_wait,
  s.sql_id, s.machine, s.program
FROM v$session s
WHERE s.state = 'WAITING'
      AND s.wait_class <> 'Idle'
ORDER BY s.seconds_in_wait DESC
FETCH FIRST 30 ROWS ONLY;
```

identifier le bloqueur rapidement

```
SELECT
  s.sid AS blocked_sid,
  s.serial# AS blocked_serial,
  s.username AS blocked_user,
  s.blocking_session AS blocker_sid,
  s.event,
  s.seconds_in_wait,
  s.sql_id
FROM v$session s
WHERE s.blocking_session IS NOT NULL
ORDER BY s.seconds_in_wait DESC;
```



Scripts for Oracle

voir l'objet impliqué (table/index) et le type de lock

```
SELECT
  bs.sid blocker_sid,
  ws.sid waiter_sid,
  lo.object_id,
  o.owner, o.object_name, o.object_type,
  ws.seconds_in_wait,
  ws.event
FROM v$session ws
JOIN v$session bs ON bs.sid = ws.blocking_session
LEFT JOIN v$locked_object lo ON lo.session_id = ws.sid
LEFT JOIN dba_objects o ON o.object_id = lo.object_id
ORDER BY ws.seconds_in_wait DESC;
```

gros consommateurs de cache/CPU.

```
SELECT
  sql_id,
  executions,
  buffer_gets,
  ROUND(buffer_gets/NULLIF(executions,0)) AS gets_per_exec,
  ROUND(elapsed_time/1e6,2) AS elapsed_s
FROM v$sql
WHERE executions > 0
ORDER BY buffer_gets DESC
FETCH FIRST 20 ROWS ONLY;
```

enlever les bruits "idle" proprement via v\$event_name

```
SELECT
  sql_id,
  executions,
  ROUND(elapsed_time/1e6,2) AS elapsed_s,
  ROUND(cpu_time/1e6,2) AS cpu_s,
  buffer_gets,
  disk_reads,
  rows -- Remplace :SQL_ID
FROM v$sql
WHERE sql_id = :SQL_ID
ORDER BY elapsed_s
FETCH FIRST 1 ROWS ONLY;
```

requêtes qui tapent le disque.

```
SELECT
  sql_id,
  executions,
  disk_reads,
  ROUND(disk_reads/NULLIF(executions,0)) AS reads_per_exec,
  buffer_gets,
  ROUND(elapsed_time/1e6,2) AS elapsed_s
FROM v$sql
WHERE executions > 0
ORDER BY disk_reads DESC
FETCH FIRST 20 ROWS ONLY;
```

afficher rapidement la requête.

```
-- Remplace :SQL_ID
SELECT sql_fulltext
FROM v$sql
WHERE sql_id = :SQL_ID
FETCH FIRST 1 ROWS ONLY;
```

diagnostiquer latence de commit (LGWR / disque / fsync)..

```
-- Événement commit critique
SELECT event, total_waits, ROUND(time_waited/100,2) AS time_waited_s
FROM v$system_event
WHERE event IN ('log file sync','log file parallel write')
ORDER BY time_waited DESC;
```



Scripts for Oracle

quels datafiles prennent le plus d'I/O.

```
SELECT
  df.file_name,
  fs.phyrds,
  fs.phywrts,
  ROUND(fs.readtim/100,2) AS read_time_s,
  ROUND(fs.writetim/100,2) AS write_time_s,
  fs.singleblkrcs,
  fs.avgiotim
FROM v$filestat fs
JOIN dba_data_files df ON df.file_id = fs.file#
ORDER BY (fs.phyrds + fs.phywrts) DESC
FETCH FIRST 20 ROWS ONLY;
```

quels objets génèrent le plus de logical reads / physical reads / ITL waits.

```
SELECT
  owner, object_name, object_type,
  SUM(CASE WHEN statistic_name='logical reads' THEN value END) AS logical_reads,
  SUM(CASE WHEN statistic_name='physical reads' THEN value END) AS physical_reads,
  SUM(CASE WHEN statistic_name='ITL waits' THEN value END) AS itl_waits
FROM v$segment_statistics
WHERE statistic_name IN ('logical reads','physical reads','ITL waits')
GROUP BY owner, object_name, object_type
ORDER BY logical_reads DESC NULLS LAST
FETCH FIRST 20 ROWS ONLY;
```

mesurer la pression redo (DML intensif)..

```
SELECT
  name,
  value
FROM v$sysstat
WHERE name IN ('redo size','redo writes','user commits','user rollbacks');
```

repérer les segments très présents en cache (utile pour comprendre la pression mémoire)..

```
SELECT
  o.owner, o.object_name, o.object_type,
  COUNT(*) AS cached_blocks
FROM v$bh bh
JOIN dba_objects o ON o.data_object_id = bh.objd
GROUP BY o.owner, o.object_name, o.object_type
ORDER BY cached_blocks DESC
FETCH FIRST 20 ROWS ONLY;
```

Scripts for Oracle

trouver des index lourds peu utiles
(attention : nécessite contexte, pas “drop automatique”).

```
SELECT
  i.owner, i.index_name, i.table_name,
  s.leaf_blocks,
  NVL(us.used, 'NO') AS used_in_monitoring
FROM dba_indexes i
LEFT JOIN dba_index_usage us
  ON us.owner = i.owner AND us.name = i.index_name
LEFT JOIN dba_ind_statistics s
  ON s.owner = i.owner AND s.index_name = i.index_name
WHERE i.owner NOT IN ('SYS','SYSTEM')
ORDER BY s.leaf_blocks DESC NULLS LAST
FETCH FIRST 30 ROWS ONLY;
```

diagnostiquer parsing, curseurs,
contention shared pool.

```
SELECT
  name, value
FROM v$sysstat
WHERE name IN ('parse count (total)',
              'parse count (hard)',
              'execute count',
              'session cursor cache hits');
```

identifier la session qui explose TEMP.

```
SELECT
  s.sid, s.serial#, s.username, s.sql_id,
  tu.tablespace,
  ROUND(tu.blocks * ts.block_size / 1024 / 1024, 2) AS temp_mb,
  s.program, s.machine
FROM v$tempseg_usage tu
JOIN v$session s ON s.saddr = tu.session_addr
JOIN (SELECT tablespace_name, block_size FROM dba_tablespaces) ts
  ON ts.tablespace_name = tu.tablespace
ORDER BY temp_mb DESC;
```

voir si les hash joins/sorts débordent sur TEMP.

```
SELECT
  name, value
FROM v$sysstat
WHERE name IN ('workarea executions - optimal',
              'workarea executions - onepass',
              'workarea executions - multipass',
              'sorts (disk)',
              'sorts (memory)');
```

9. Erreurs d'architecture qui coûtent cher



AU FINAL LE MOT DE LA FIN !!

- *“On peut optimiser SQL pendant des semaines...si l'infrastructure est mal conçue, on perd la bataille avant de commencer.”*





ERREURS D'ARCHITECTURE QUI COUTENT CHER

Mauvaise pratique

Impact

Tout sur un seul LUN

Goulot I/O

Redo sur NAS

Commit lents

Pas de monitoring latence

Incident invisible

FRA sous-dimensionnée

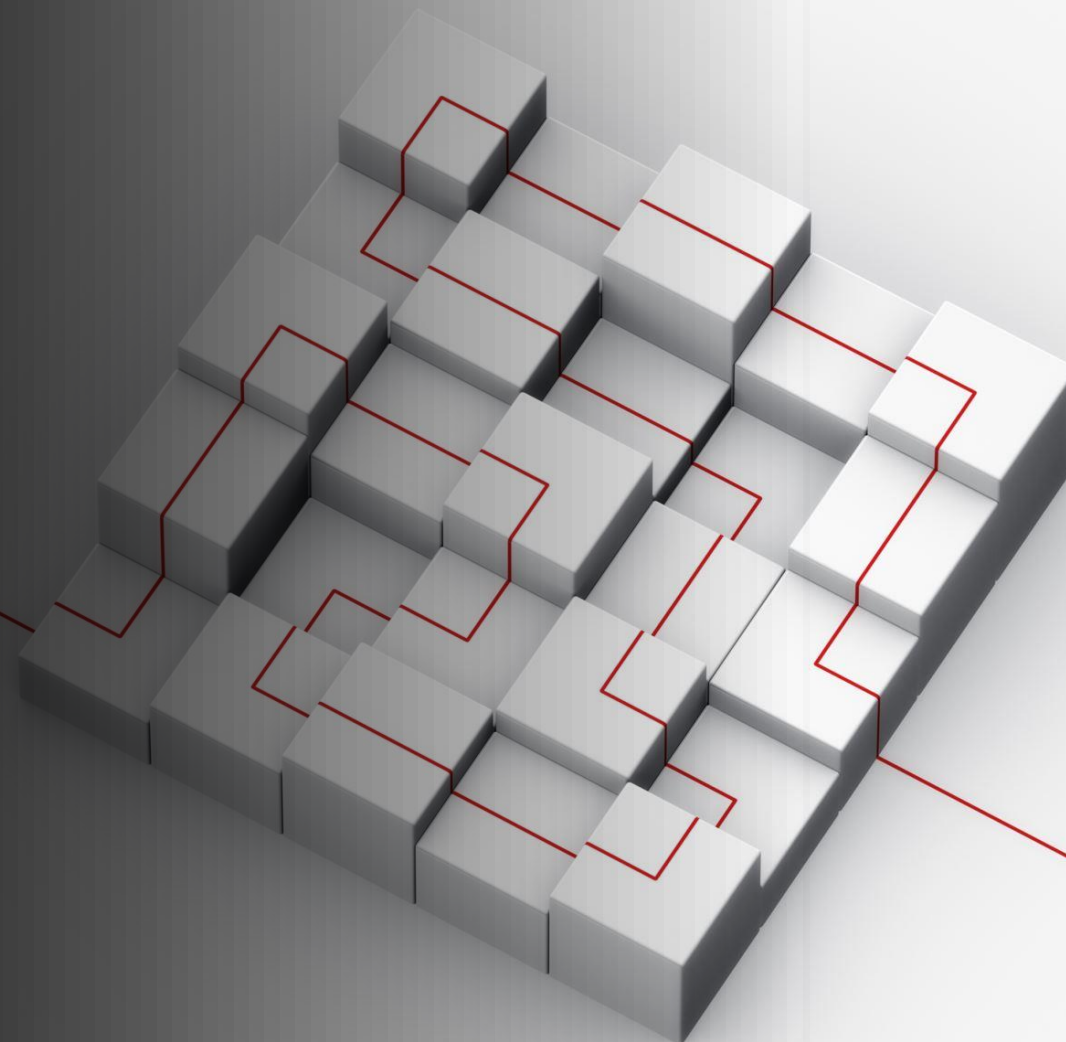
Base bloquée





3

Performance Tuning



“On ne tune pas Oracle... on réduit le temps d’attente.”



3 – PERFORMANCE TUNING ORACLE

- 1. La vérité sur la performance Oracle
- 2. AWR — Automatic Workload Repository
- 3. ASH — Active Session History
- 4. Les Wait Events (le langage secret d'Oracle)
- 5. Identifier les SQL qui détruisent la perf
- 6. Lire un Plan d'Exécution
- 7. Cas réel — Incident critique
- 8. Instance Tuning (quand c'est Oracle, pas SQL)
- 9. Méthodologie de DBA Senior
- 10. Outils Avancés



Diagnostic

- AWR / ASH / ADDM
- Statspack (legacy mais utile)
- Wait Events & Time Model
- Top SQL / SQL parsing issues

SQL Tuning

- Explain Plan / DBMS_XPLAN
- Indexing strategy (B-Tree, Bitmap, Function-based)
- Histograms & Optimizer Stats
- Bind Peeking / Adaptive Plans

Instance Tuning

- SGA sizing, PGA_AGGREGATE_TARGET
- Redo log sizing
- Latch/Mutex contention

SQL ordered by CPU Time

- Resources required by PL/SQL code include the resources used by all SQL statements called by the code.
- %Total - CPU Time as a percentage of Total CPU
- %CPU - CPU Time as a percentage of SGA Size
- %IO - IO Time as a percentage of SGA Size
- Top SQL account for 98.9% of Total CPU Time (all SQL)
- Top SQL account for 98.9% of Total CPU Time (all SQL)

CPU Time (s)	Executions	CPU per Exec. (s)	%Total	Elapsed Time (s)	%CPU	%IO	SQL ID	SQL Module	SQL Text
425.12	1,000	0.425	17.71	124.71	14.71	4.71	0000000000000000	PL/SQL: anonymous block	PL/SQL: anonymous block
333.12	1,000	0.333	14.01	124.41	14.91	1.71	0000000000000000	PL/SQL: anonymous block	PL/SQL: anonymous block
277.12	1,000	0.277	11.61	124.01	14.91	4.71	0000000000000000	PL/SQL: anonymous block	PL/SQL: anonymous block
211.12	1,000	0.211	8.81	123.91	14.91	1.71	0000000000000000	PL/SQL: anonymous block	PL/SQL: anonymous block
155.12	1,000	0.155	6.51	123.81	14.91	1.71	0000000000000000	PL/SQL: anonymous block	PL/SQL: anonymous block
99.12	1,000	0.099	4.11	123.71	14.91	1.71	0000000000000000	PL/SQL: anonymous block	PL/SQL: anonymous block
43.12	1,000	0.043	1.81	123.61	14.91	1.71	0000000000000000	PL/SQL: anonymous block	PL/SQL: anonymous block
37.12	1,000	0.037	1.51	123.51	14.91	1.71	0000000000000000	PL/SQL: anonymous block	PL/SQL: anonymous block
31.12	1,000	0.031	1.31	123.41	14.91	1.71	0000000000000000	PL/SQL: anonymous block	PL/SQL: anonymous block
25.12	1,000	0.025	1.01	123.31	14.91	1.71	0000000000000000	PL/SQL: anonymous block	PL/SQL: anonymous block
19.12	1,000	0.019	0.81	123.21	14.91	1.71	0000000000000000	PL/SQL: anonymous block	PL/SQL: anonymous block
13.12	1,000	0.013	0.51	123.11	14.91	1.71	0000000000000000	PL/SQL: anonymous block	PL/SQL: anonymous block
7.12	1,000	0.007	0.31	123.01	14.91	1.71	0000000000000000	PL/SQL: anonymous block	PL/SQL: anonymous block
1.12	1,000	0.001	0.01	122.91	14.91	1.71	0000000000000000	PL/SQL: anonymous block	PL/SQL: anonymous block

1. La vérité sur la performance Oracle



QUELQUES ELEMENTS CLES POUR TUNER ORACLE

- Oracle attend. Et le tuning consiste à comprendre ce qu'il attend.
- “La performance Oracle, c’est de la gestion du temps d’attente.”



Type d'attente	Signification
CPU	Calcul
I/O	Lecture/écriture disque
Concurrency	Verrous
Network	Attente client

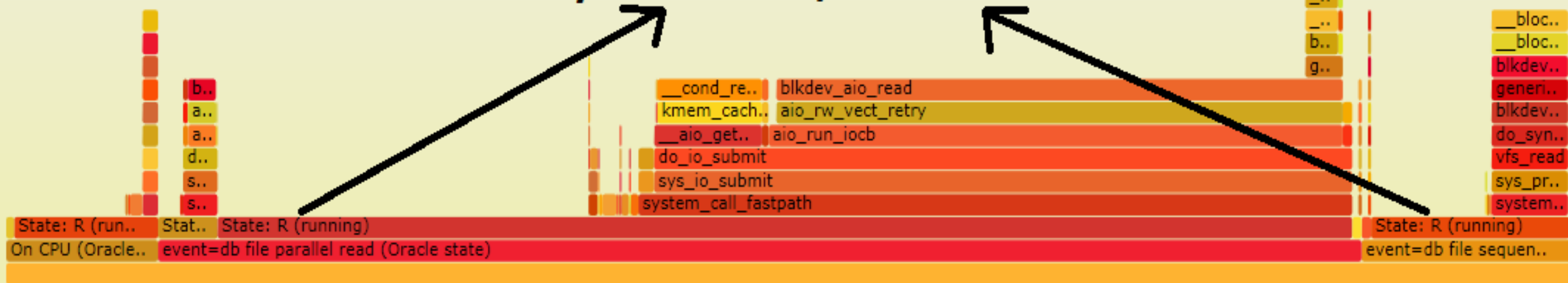


CPU CYCLES INSIDE I/O WAIT EVENTS

Kernel stack, OS State and Wait event profiling of Oracle random I/O (SLOB workload, low latency I/O)

Search

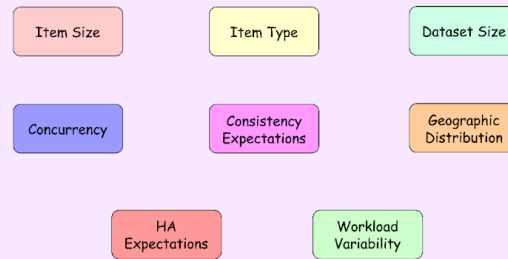
CPU cycles inside I/O wait events



ELABORER DES STRATEGIES

A Cheatsheet On Database Performance Strategies

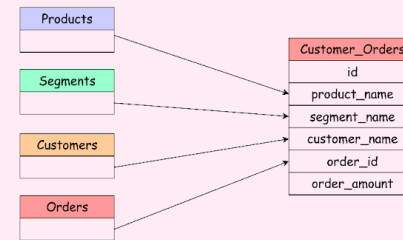
1 Factors Affecting Database Performance



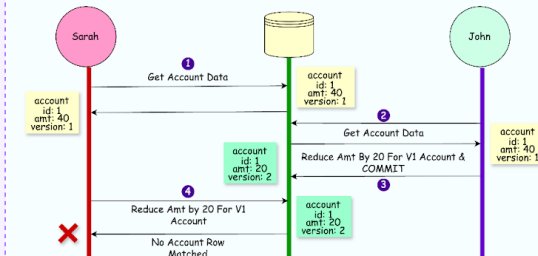
2 Impact of Workloads

- Write-heavy workloads can lead to increased latency, lock contention, and index maintenance overhead
- Read heavy workloads pose challenges around high latency for complex queries, cache misses, and strain on single database
- Delete-heavy workloads can lead to fragmentation and performance degradation
- Competing real-time vs batch workloads can increase latency due to resource contention

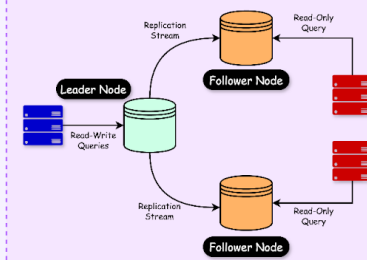
3 Denormalization



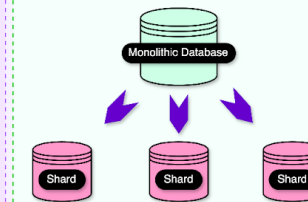
4 Database Locking



5 Database Replication



6 Sharding



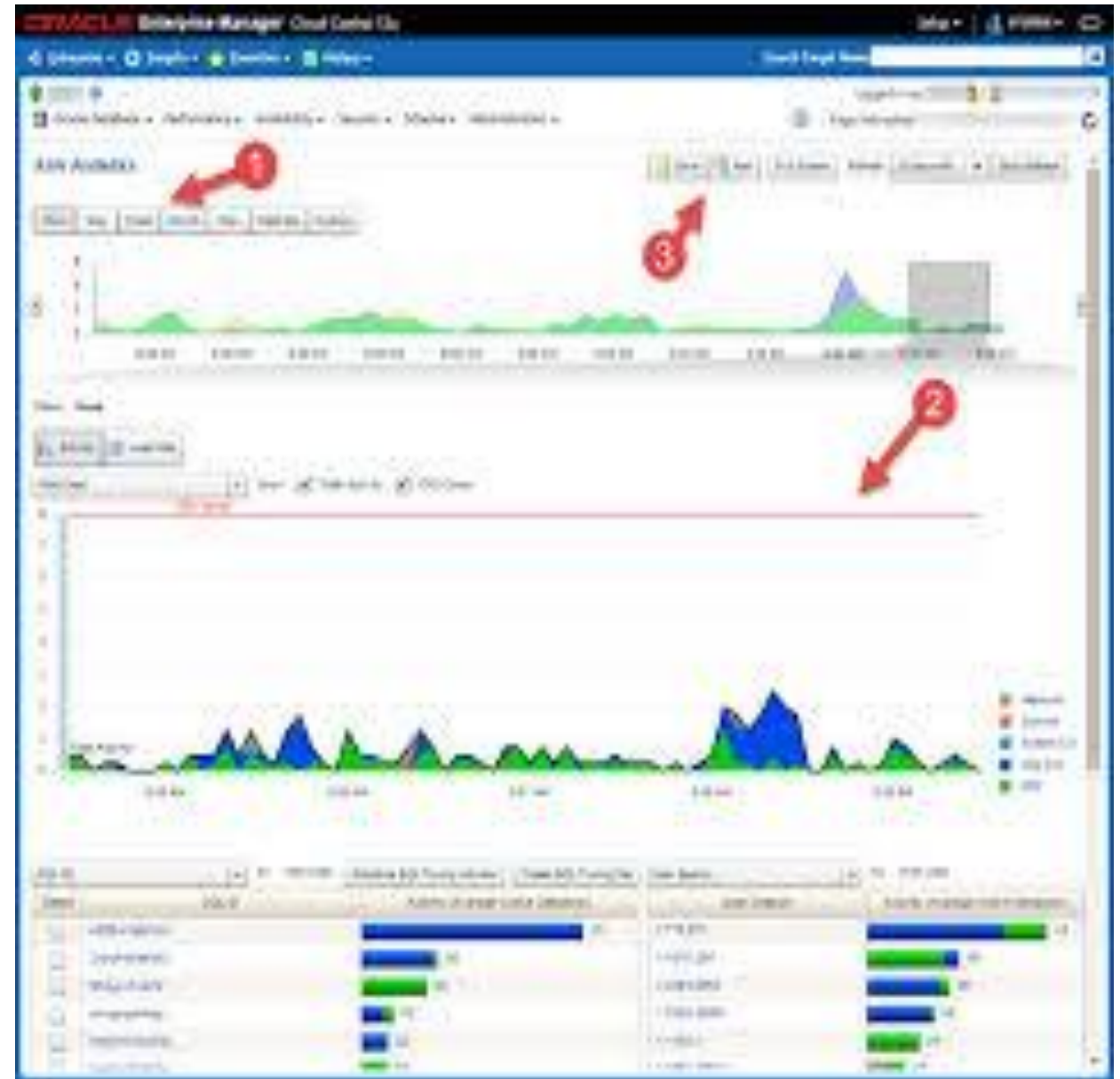
7 Database Indexing

Email	Painter	Cust_Id	Email
alice@example.com	2	1	john@example.com
bob@example.com	3	2	alice@example.com
jane@example.com	5	3	bob@example.com
john@example.com	1	4	mark@example.com
mark@example.com	4	5	jane@example.com

PERFORMANCES ANALYSIS



PERFORMANCES ANALYSIS



2. AWR — Automatic Workload Repository

AWR

À quoi sert AWR ?

- Capture snapshots performance
- Compare deux périodes
- Identifier dérives

Sections clés à analyser

Section	Ce qu'on cherche
Top Wait Events	Où le temps est perdu
Load Profile	Variation charge
Instance Efficiency	Buffer cache, parse ratio
SQL ordered by Elapsed Time	Requêtes lentes

“Un AWR est un scanner IRM de la base.”



3. ASH — Active Session History



ASH : LES BONNES QUESTIONS

ASH = photo toutes les secondes des sessions actives.

Permet de répondre à :

- Qui était actif ?
- Sur quoi ?
- En attente de quoi ?

Exemple concret :

“À 14h03, 80% des sessions attendaient ‘db file sequential read’ → problème index I/O.”



4. Les Wait Events (le langage secret d'Oracle)

COMPRENDRE ET ANALYSER LES WAITS EVENT

Wait Event	Signification	Cause typique
db file sequential read	Lecture index	I/O lent
db file scattered read	Full scan	SQL mal optimisé
log file sync	Commit lent	Redo ou stockage
enq: TX row lock	Blocage	Concurrence

“Dis-moi ton wait event, je te dirai ton problème.”



FOREGROUND EVENTS

Top 10 Foreground Events by Total Wait Time

Event	Waits	Total Wait Time (sec)	Wait Avg(ms)	% DB time	Wait Class
DB CPU		1961.3		84.3	
cell single block physical read	205,516	183.4	1	7.9	User I/O
log file sync	378,919	153.1	0	6.6	Commit
SQL*Net message from dblink	14,310	91.4	6	3.9	Network
library cache lock	8,074	45.7	6	2.0	Concurrency
latch: parallel query alloc buffer	1,836	42.2	23	1.8	Other
control file sequential read	56,817	38.1	1	1.6	System I/O
library cache: mutex X	10,766	19.7	2	.8	Concurrency
SQL*Net more data from client	330,803	12.5	0	.5	Network
os thread startup	1,008	9.9	10	.4	Concurrency

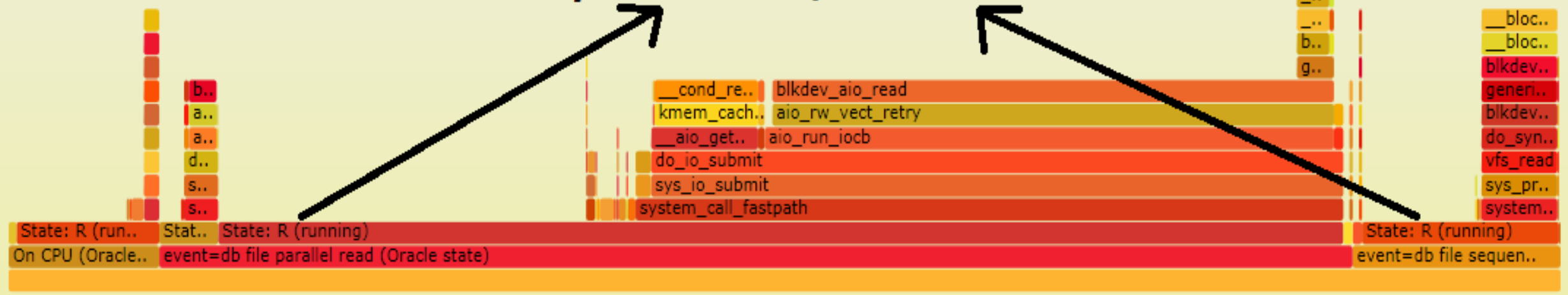


I/O WAIT EVENTS

Kernel stack, OS State and Wait event profiling of Oracle random I/O (SLOB workload, low latency I/O)

Search

CPU cycles inside I/O wait events



5. Identifier les SQL qui détruisent la perf



SQL ANALYSIS

```
SELECT sql_id, executions, elapsed_time/1000000 seconds  
FROM v$sql  
ORDER BY elapsed_time DESC FETCH FIRST 10 ROWS ONLY;
```



Ce qu'on cherche :

- SQL très exécuté
- SQL très long
- SQL qui fait des full scans



6. Lire un Plan d'Exécution



COMPRENDRE UN EXPLAIN

```
SELECT * FROM TABLE(DBMS_XPLAN.DISPLAY_CURSOR(NULL, NULL, 'ALLSTATS LAST'));
```



Opération	Signification
Full Table Scan	Mauvais filtre ou index absent
Index Range Scan	OK
Nested Loop	Petit dataset
Hash Join	Gros volumes



7. Cas réel — Incident critique

GESTION D'UN INCIDENT CRITIQUE

Symptôme : CPU 90%, base lente

AWR montre : "db file scattered read"

Analyse : Requête sans index, full scan sur table 200M lignes

Solution :

```
CREATE INDEX idx_orders_date ON orders(order_date);
```



 Résultat :

Temps requête passé de 12 min → 3 sec



8. Instance Tuning (quand c'est Oracle, pas SQL)



TUNING ORACLE

Problème

Paramètre

Trop de parsing

shared_pool_size

Sort en disque

pga_aggregate_target

Buffer cache faible

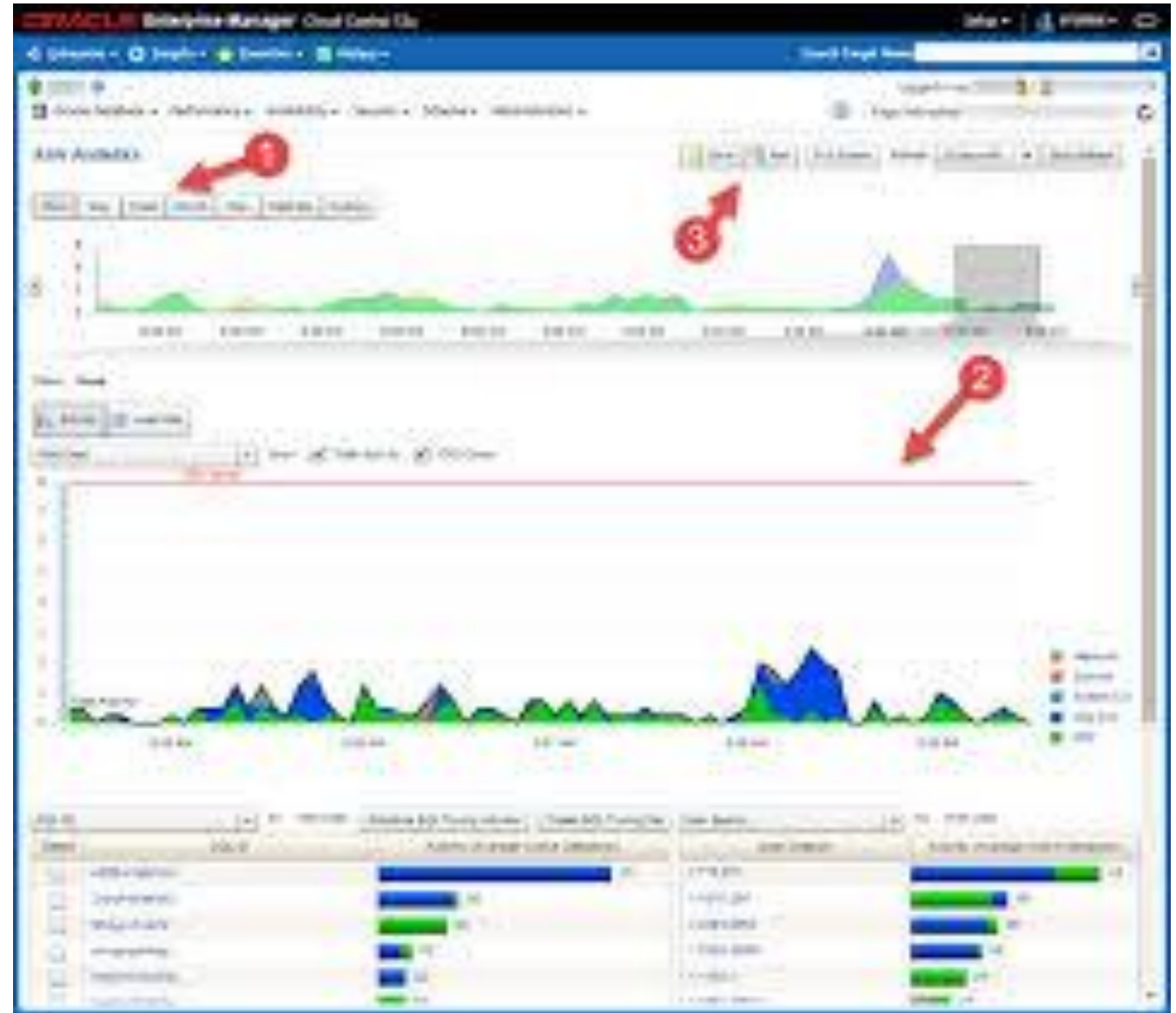
db_cache_size



```
SHOW PARAMETER pga;
```



Diagnostic



SQL TUNING

The screenshot shows the dbForge Studio for Oracle interface. The main window displays the following SQL query:

```
SELECT C.FIRST_NAME, C.LAST_NAME, P.AMOUNT
FROM CUSTOMER c
INNER JOIN PAYMENT p ON C.CUSTOMER_ID = P.CUSTOMER_ID;
```

The bottom right pane shows the EXPLAIN PLAN results for the query, executed at 5:34:57 PM 7/26/2022 (0.005s). The results are as follows:

Name	Object Owner	Object Name	Optimizer Mode	Options
SELECT STATEMENT Step 6 of 6			ALL_ROWS	
NESTED LOOPS Step 5 of 6				
NESTED LOOPS Step 3 of 6				
SYS.CUSTOMER TABLE ACCESS (FULL) Step 1 of 6	SYS	CUSTOMER	ANALYZED	FULL
SYS.IDX_FK_CUSTOMER_ID INDEX (RANGE SCAN) Step 2 of 6	SYS	IDX_FK_CUSTOMER_ID	ANALYZED	RANGE SCAN
SYS.PAYMENT TABLE ACCESS (BY INDEX ROWID) Step 4 of 6	SYS	PAYMENT	ANALYZED	BY INDEX ROWID

The interface also shows a Query Profiler tree on the left with the following structure:

- Query Profiler
 - 5:34:57 PM 7/26/2022 (0.005s)
 - Plan
 - Session statistics

The status bar at the bottom indicates: AutoCommit OFF, Query executed successfully, 0:00:01.641, JordanSanders (19c), sys. The status bar also shows the current cursor position: Ln 8 Col 39 Ch 39.



EXPLAIN PLAN

Id	Operation	Rows	Bytes	Cost (%CPU)	Time
0	SELECT STATEMENT	1	141	3704 (1)	00:00:45
1	SORT GROUP BY	1	141	3704 (1)	00:00:45
2	NESTED LOOPS				
3	NESTED LOOPS	1	141	3703 (1)	00:00:45
4	NESTED LOOPS	4	396	10 (10)	00:00:01
5	TABLE ACCESS BY INDEX ROWID	1	18	1 (0)	00:00:01
* 6	INDEX UNIQUE SCAN	1		0 (0)	00:00:01
7	VIEW	4	324	9 (12)	00:00:01
8	SORT GROUP BY	4	228	9 (12)	00:00:01
9	NESTED LOOPS	31	1767	8 (0)	00:00:01
10	MERGE JOIN CARTESIAN	819	27027	8 (0)	00:00:01
* 11	INDEX RANGE SCAN	1	10	2 (0)	00:00:01
12	BUFFER SORT	819	18837	6 (0)	00:00:01
* 13	TABLE ACCESS STORAGE FULL	819	18837	6 (0)	00:00:01
* 14	INDEX UNIQUE SCAN	1	24	0 (0)	00:00:01
* 15	INDEX RANGE SCAN	1745		288 (0)	00:00:04
* 16	TABLE ACCESS BY INDEX ROWID	1	42	1825 (1)	00:00:22



METHODOLOGIE DU DBA

- **1. Identifier l'attente dominante**



- **2. Voir les SQL concernés**



- **3. Lire les plans**



- **4. Corriger le SQL / index**



- **5. Adapter l'infra si besoin**

“On ne commence jamais par les paramètres. On commence par les faits.”



10. Outils Avancés



OUTILS AVANCES

Outil

Usage

ADDM

Diagnostic auto

SQL Tuning Advisor

Suggestions

SQL Monitor

Temps réel



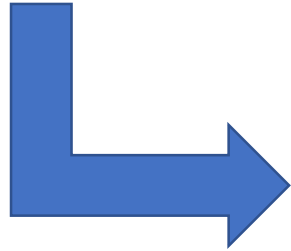
ADDM

Rôle

ADDM analyse les snapshots AWR et répond à :

👉 “Pourquoi la base est lente ?”

Il classe les problèmes par impact sur le temps DB.



Ce qu'ADDM analyse

Domaine	Exemples détectés
SQL	Requêtes lourdes
I/O	Latence disque
Mémoire	Shared pool trop petit
Concurrence	Verrous
Configuration	Paramètres sous-optimaux

Exemple de Finding ADDM

“SQL statement with SQL_ID abc123 consumed 48% of DB time.”

- ➔ Impact business : requête critique
- ➔ Recommandation : SQL Tuning Advisor



ADDM REPORT

My ADDM (Sample) Report.txt
ADDM Report for Task 'TASK_964'

Analysis Period

AWR snapshot range from 99 to 105.
Time period starts at 03-APR-13 07.08.18 PM
Time period ends at 04-APR-13 07.20.18 PM

Analysis Target

Database 'REDANT' with DB ID 629811920.
Database version 11.2.0.1.0.
ADDM performed an analysis of instance orcl, numbered 1 and hosted at prashant.

Activity During the Analysis Period

Total database time was 452 seconds.
The average number of active sessions was .01.

Summary of Findings

Description	Active Sessions Percent of Activity	Recommendations
1 I/O Throughput	.01 100	3
2 Undersized instance memory	0 7.75	1
3 Hard Parse Due to Invalidations	0 5.3	1
4 "Other" Wait Class	0 4.95	0
5 Commits and Rollbacks	0 4.14	1
6 PL/SQL Compilation	0 4.05	1
7 Checkpoints Due to MTTR	0 3.44	1
8 Checkpoints Due to DROP or TRUNCATE	0 3	0
9 Hard Parse Due to Sharing Criteria	0 2.14	1

Findings and Recommendations

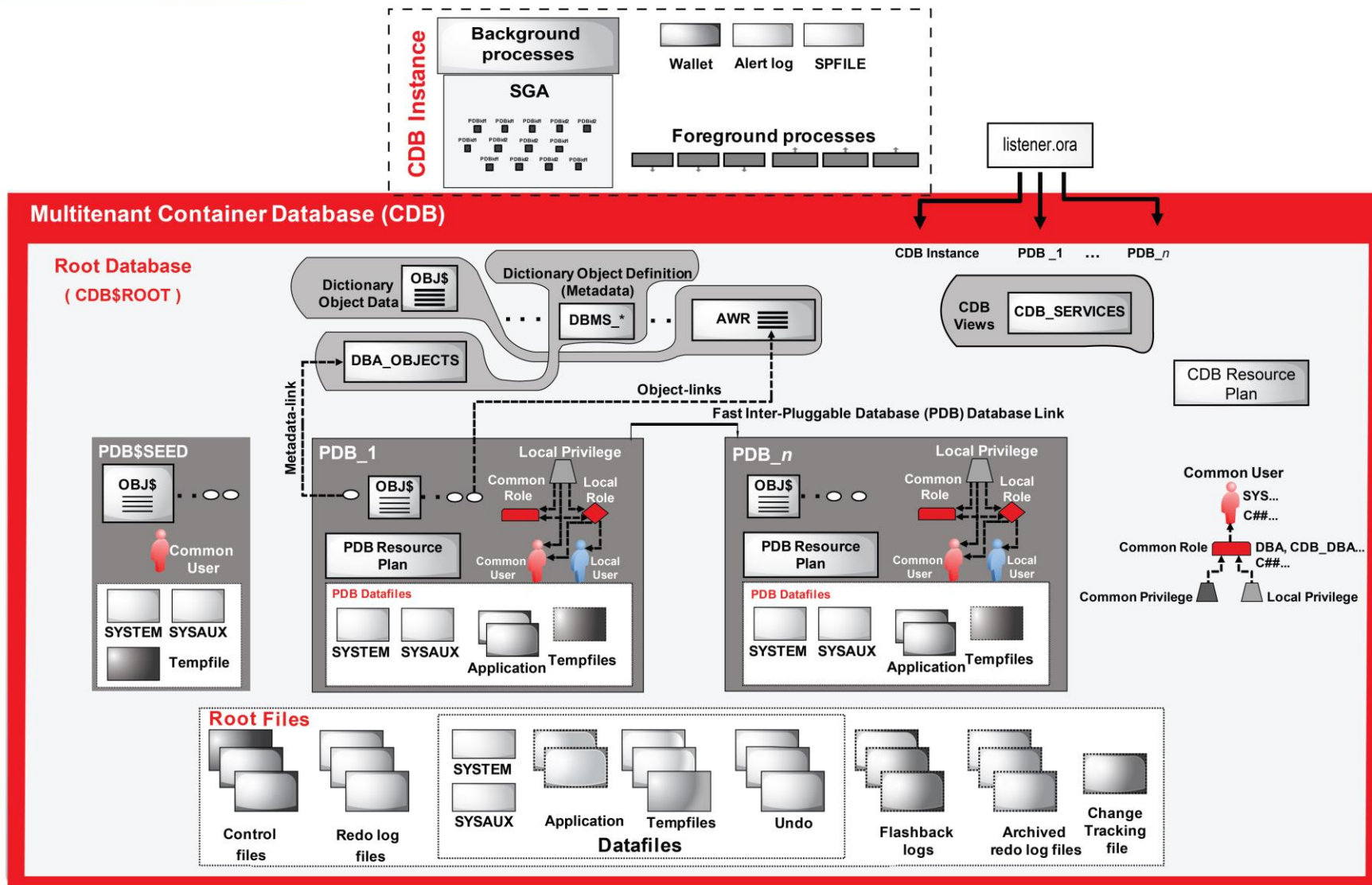
Finding 1: I/O Throughput
Impact is .01 active sessions, 100% of total activity.



Multitenant Architecture Diagram

ORACLE 12c DATABASE

Multitenant Architecture Diagram



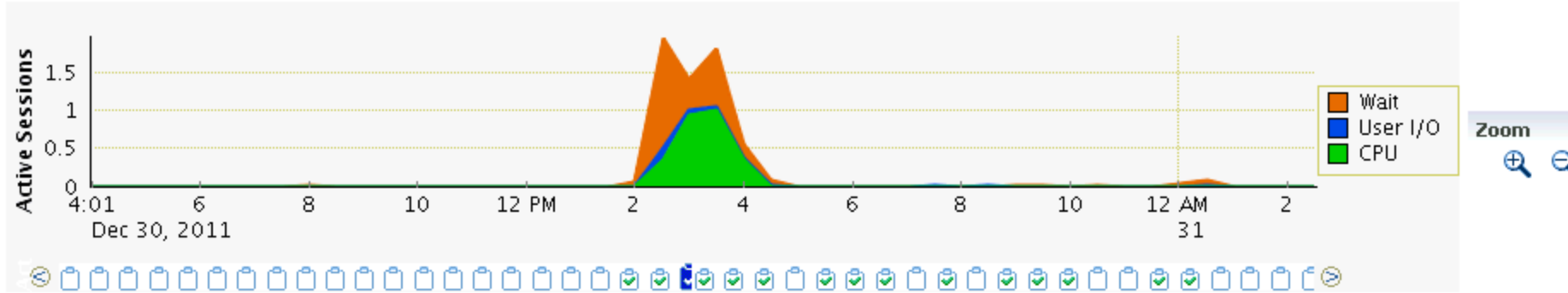
DataBase Activity

Database Activity

Run ADDM

Finding History

The icon selected below the graph identifies the ADDM analysis period. Click on a different icon to select a different analysis period.



TIP For an explanation of the icons and symbols used in this page, see the [Icon Key](#)

ADDM Performance Analysis

Task Name ADDM:644923168_1_1016

Filters

View Snapshots

View Report

JVM Diagnostics

Task Owner SYS

Average Active Sessions 1.5

Period Start Time Dec 30, 2011 2:30:41 PM

End Time Dec 30, 2011 3:00:06 PM

Impact (%)	Finding	Occurrences (24 hrs ending with analysis period)
100	Virtual Memory Paging	3 of 49
65.2	Top SQL Statements	2 of 49
7.6	"Scheduler" Wait Class	2 of 49
5.5	Shared Pool Latches	2 of 49
3.6	"User I/O" wait Class	3 of 49
2.2	Soft Parse	3 of 49
2.2	Hard Parse Due to Sharing Criteria	3 of 49

Informational Findings

Enterprise manager

The screenshot shows the Oracle Enterprise Manager Cloud Control 12c interface. The top navigation bar includes 'Enterprise', 'Targets', 'Favorites', and 'History'. Below this, the 'Oracle Database' navigation menu is open, showing 'Performance', 'Availability', 'Security', 'Schema', and 'Administration'. The 'Performance' menu is expanded, listing various monitoring tools. The 'Real-Time ADDM' option is highlighted in yellow, with a mouse cursor pointing to it. On the left, the 'Summary' section displays database status metrics such as Up Time, Version, Load, Total Sessions, Last Backup, Available Space, Used Space, and Total SGA. Below this is the 'Diagnostics' section, showing ADDM Findings and Incidents. On the right, a 'Performance' panel features a chart titled 'Activity Class' with a y-axis labeled 'Active Sessions' ranging from 0 to 8. A red horizontal line is drawn at the 8 level on the chart. The time '8:40 AM' is displayed at the bottom of the chart area.

Oracle Enterprise Manager Cloud Control 12c

Enterprise Targets Favorites History

Oracle Database Performance Availability Security Schema Administration

Summary

Status

Up Time	4
Version	1
Load	0
Total Sessions	1
Last Backup	1
Available Space	1
Used Space	1
Total SGA	1

Diagnostics

ADDM Findings	0
Incidents	0

Performance Home
Top Activity
ASH Analytics
SQL Monitoring
SQL
AWR
Advisors Home
Emergency Monitoring
Real-Time ADDM
Adaptive Thresholds
Search Sessions
Blocking Sessions
Database Replay

Performance
Activity Class

Active Sessions

8
7
6
5
4
3
2
1
0

8:40 AM

ADDM EN CONCLUSION

• “ADDM me donne une vue priorisée. Je ne cherche pas à optimiser tout, je corrige ce qui coûte le plus cher en temps base.”

! Limites

- Basé sur snapshots (pas instantané)
- Donne des pistes, pas des solutions finales
- Nécessite Diagnostic Pack licence

STA : SQL Tuning Advisor



STA : Le Chirurgien des requêtes SQL

Analyse une requête SQL précise et propose :

- Nouveaux index
- SQL Profile
- Réécriture SQL
- Statistiques manquantes

```
DECLARE
  my_task_name VARCHAR2(30);
BEGIN
  my_task_name := 'tuning_task';
  DBMS_SQLTUNE.CREATE_TUNING_TASK(
    sql_id => 'abc123',
    task_name => my_task_name);

  DBMS_SQLTUNE.EXECUTE_TUNING_TASK(task_name => my_task_name);
END;
```

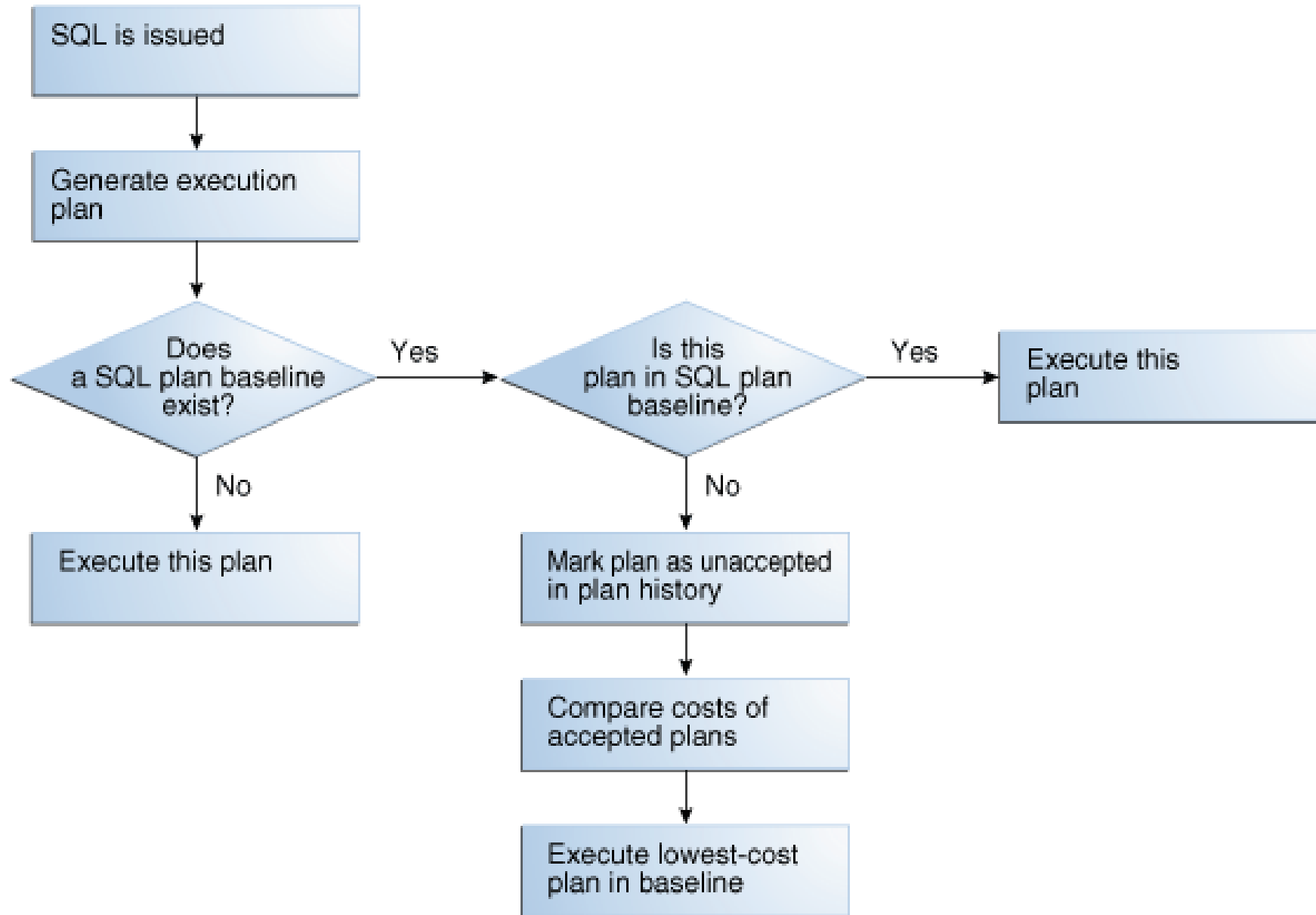
```
SELECT DBMS_SQLTUNE.REPORT_TUNING_TASK('tuning_task') FROM dual;
```

Reco	Impact estimé
Create index	-80% coût
SQL Profile	Plan plus stable
Stats refresh	Optimizer fiable

Exemple de recommandation

***“Je ne crée pas un index parce que je le pense...
je le crée parce que l’optimizer le prouve.”***

STA : FLOW DIAGRAMS



SQL ADVISOR TASKS

Advisor Tasks

Search
Select an advisory type and optionally enter a task name to filter the data that is displayed in your results set.

Advisory Type: Task Name: Advisor Runs: Status:

By default, the search returns all uppercase matches beginning with the string you entered. To run an exact or case-sensitive match, double quote the search string. You

Results

Actions

Select	Name	Advisory Type	Description
<input checked="" type="radio"/>	SYS_AUTO_SQL_TUNING_TASK	SQL Tuning Advisor	Automatic SQL Tuning Task
<input type="radio"/>	SQL_TUNING_STDBY_1611613158871	SQL Tuning Advisor	
<input type="radio"/>	SQL_TUNING_STDBY_1611610246473	SQL Tuning Advisor	
<input type="radio"/>	SQL_TUNING_STDBY_1611350803773	SQL Tuning Advisor	
<input type="radio"/>	SQL_TUNING_STDBY_1611345857080	SQL Tuning Advisor	
<input type="radio"/>	SQL_TUNING_STDBY_1611345214292	SQL Tuning Advisor	
<input type="radio"/>	SQL_TUNING_1611344653781	SQL Tuning Advisor	
<input type="radio"/>	SQL_TUNING_STDBY_1611342484553	SQL Tuning Advisor	
<input type="radio"/>	SQL_TUNING_1611154813773	SQL Tuning Advisor	
<input type="radio"/>	SQL_TUNING_STDBY_161108144176A	SQL Tuning Advisor	
<input type="radio"/>	SQL_TUNING_STDBY_1611081441766	SQL Tuning Advisor	
<input type="radio"/>	SQL_TUNING_1611074640924	SQL Tuning Advisor	
<input type="radio"/>	SQL_TUNING_STDBY_1610746593812	SQL Tuning Advisor	
<input type="radio"/>	SQL_TUNING_STDBY_1610744289779	SQL Tuning Advisor	

Actions

Annotations:
- Red arrow pointing to SYS_AUTO_SQL_TUNING_TASK: View only from the standby
- Red arrow pointing to SQL_TUNING_STDBY_1611610246473: Can implement SQL Profile recommendations from the standby
- Red arrow pointing to SQL_TUNING_1611344653781: View only from the standby

SQL FINDINGS

Summary **SQL findings** SQL without findings

Implement all SQL profile recommendations

Findings by type: All Findings by object: All

	SQL		Parsing schema	Benefit		Findings with recommendations					Miscellaneous findings
	Text	ID		DB time(sec)	Per-execution %	Statistics	SQL profile	Index	Restructure SQL	Alternative plan	
<input checked="" type="checkbox"/>	WITH NONTIMEG...	4u5zq7r9y690a	DBSNMP	1.851287	84	-	✓	✓	-	-	-
<input type="checkbox"/>	SELECT /*+ NO_S...	28r0ygy5bjdt9	SYS	0.464539	99	-	✓	-	-	-	✓
<input type="checkbox"/>	SELECT /*+ NO_S...	3wpjk5t80m5x9	SYS	0.317807	99	-	✓	-	-	✓	✓
<input type="checkbox"/>	SELECT schema, c...	9c9mmbdf6uamn	DBSNMP	0.071438	14	-	✓	-	-	✓	✓

1 selected

Showing 44 items < 1 2 3 4 5 >

Implement one recommendation for SQL ID: [4u5zq7r9y690a](#)

Type	Findings	Recommendations	Rationale	Benefit %
SQL profile	2 potentially better execution plans were found for this statement. Choose one of the following SQL profiles to implement.	Consider accepting the recommended SQL profile to use parallel execution for this statement.	-	84
Index	The execution plan of this statement can be improved by creating one or more indices.	Consider running the Access Advisor to improve the physical schema design or creating the recommended index.DBSNMP.BSLN_METRIC_DEFAULTS("STATUS","METRIC_ID")	Creating the recommended indices significantly improves the execution plan of this statement. However, it might be preferable to run "Access Advisor" using a representative SQL workload as opposed to a single statement. This will allow to get comprehensive index recommendations which takes into account index maintenance overhead and additional space consumption.	84.02

Compare explain plans
Implement recommendation

SQL PERFORMANCE ANALYZER TASK REPORT

SQL Performance Analyzer Task Report: SYS.SPA_GUIDED_WORKFLOW

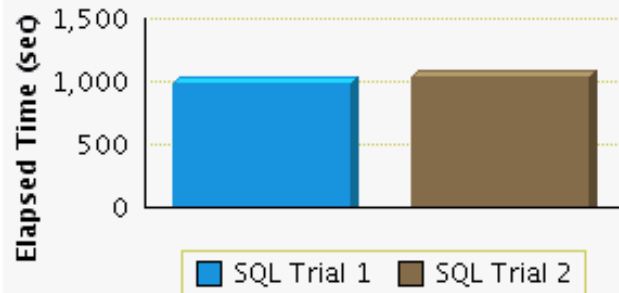
Save Mail

SQL Tuning Set Name DOCTEST3
 STS Owner SYS
 Total SQL Statements 450
 SQL Statements With Errors 11

SQL Trial 1 SQL_TRIAL_1336002531305
 SQL Trial 2 SQL_TRIAL_1336002653572
 Comparison Metric Elapsed Time

Global Statistics

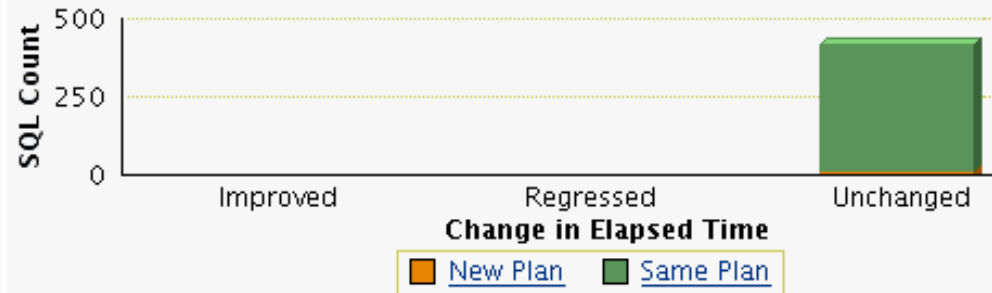
Projected Workload Elapsed Time



Improvement Impact 0% →
 Regression Impact -2% ↓

Overall Impact -2% ↓

SQL Statement Count



Change in Elapsed Time

New Plan Same Plan

Recommendations

Oracle offers two options to fix regressed SQL resulting from plan changes:

Use the better execution plan from SQL Trial 1 by creating SQL Plan Baselines.

Create SQL Plan Baselines

Explore alternate execution plans using SQL Tuning Advisor.

Run SQL Tuning Advisor

Top 10 SQL Statements Based on Impact on Workload

	SQL ID	Net Impact on Workload (%)	Elapsed Time (sec)		Net Impact on SQL (%)	New Plan
			SQL Trial 1	SQL Trial 2		
↓	awnhwd6pzc9u	-1.650	0.007	0.023	-243.800	Y
↓	5yv7yvjjxugg	-0.940	0.008	0.008	-6.160	N
↑	awnhwd6pzc9u	0.450	0.023	0.006	71.490	Y
↓	b6hngv59vsyhb	-0.450	0.007	0.007	-7.130	N
↑	5ks1carg0dz1w	0.420	0.056	0.051	7.970	N

⚠ Limites

- Ne comprend pas toujours la logique métier
- Peut suggérer trop d'index
- À valider en pré-prod

SQL Monitor

Le moniteur cardiaque des requêtes en temps réel

Permet de voir une requête pendant qu'elle s'exécute

- Où elle passe son temps
- Quelle étape bloque
- Si elle fait du parallélisme

```
SELECT DBMS_SQLTUNE.REPORT_SQL_MONITOR(  
  sql_id => 'abc123',  
  type => 'TEXT',  
  report_level => 'ALL')  
FROM dual;
```

Requête bloquée depuis 2h

SQL Monitor montre :

→ 92% du temps dans "PX Deq Credit: send blkd"

→ Problème de parallélisme mal calibré

Info

Utilité

Temps par étape

Identifier le goulot

I/O par opération

Disque ou CPU ?

Parallelism

Threads efficaces ?

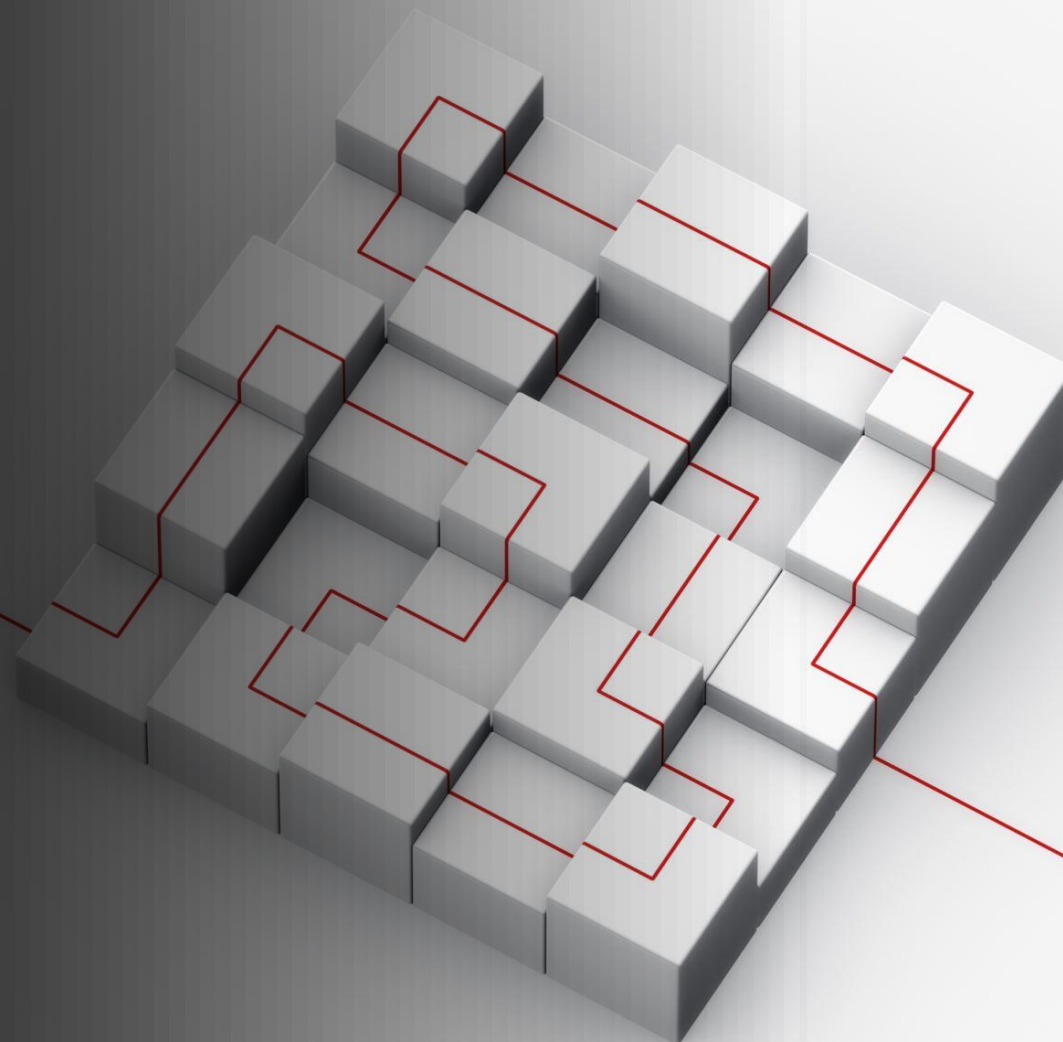
Ce qu'on voit

"SQL Monitor me permet de diagnostiquer une requête pendant qu'elle souffre, pas après son décès."



4

Conception & Modélisation des Bases



4 - DATA MODEL & CONCEPTION ORACLE

- 1. Modélisation : Performance vs Pure théorie
- 2. Volumétrie — Penser à 5 ans, pas à aujourd'hui
- 3. Partitioning — L'arme secrète du DBA Oracle
- 4. Stratégie d'Index
- 5. Index Locaux vs Globaux (Partitioned Tables)
- 6. Data Lifecycle — Hot / Warm / Cold
- 7. Compression & In-Memory
- 8. Erreurs de design les plus coûteuses
- 9. Ce que fait un DBA senior



1. Modélisation : Performance vs Pure théorie

Approche	Avantage	Risque
3NF stricte	Intégrité	Trop de joins
Dénormalisation	Moins de joins	Redondance
Hybride (réel)	Performance maîtrisée	Besoin DBA impliqué

Avantages / Risques

“Je ne fais pas du modèle académique, je fais du modèle qui tient la charge.”

Normalization vs Denormalization

Product_Id	Name	Price
1	Shirt	29.99
2	Jeans	49.99
3	Shoes	79.99
...

Products Table

Order_Id	Product_Id	Quantity
1	1	2
2	2	1
3	1	3
...

Orders Table

Normalized Tables

Orders Table (Denormalized)

Order_Id	Product_Id	Quantity	Name	Price
1	1	2	Shirt	29.99
2	2	1	Jeans	49.99
3	1	3	Shirt	29.99
...

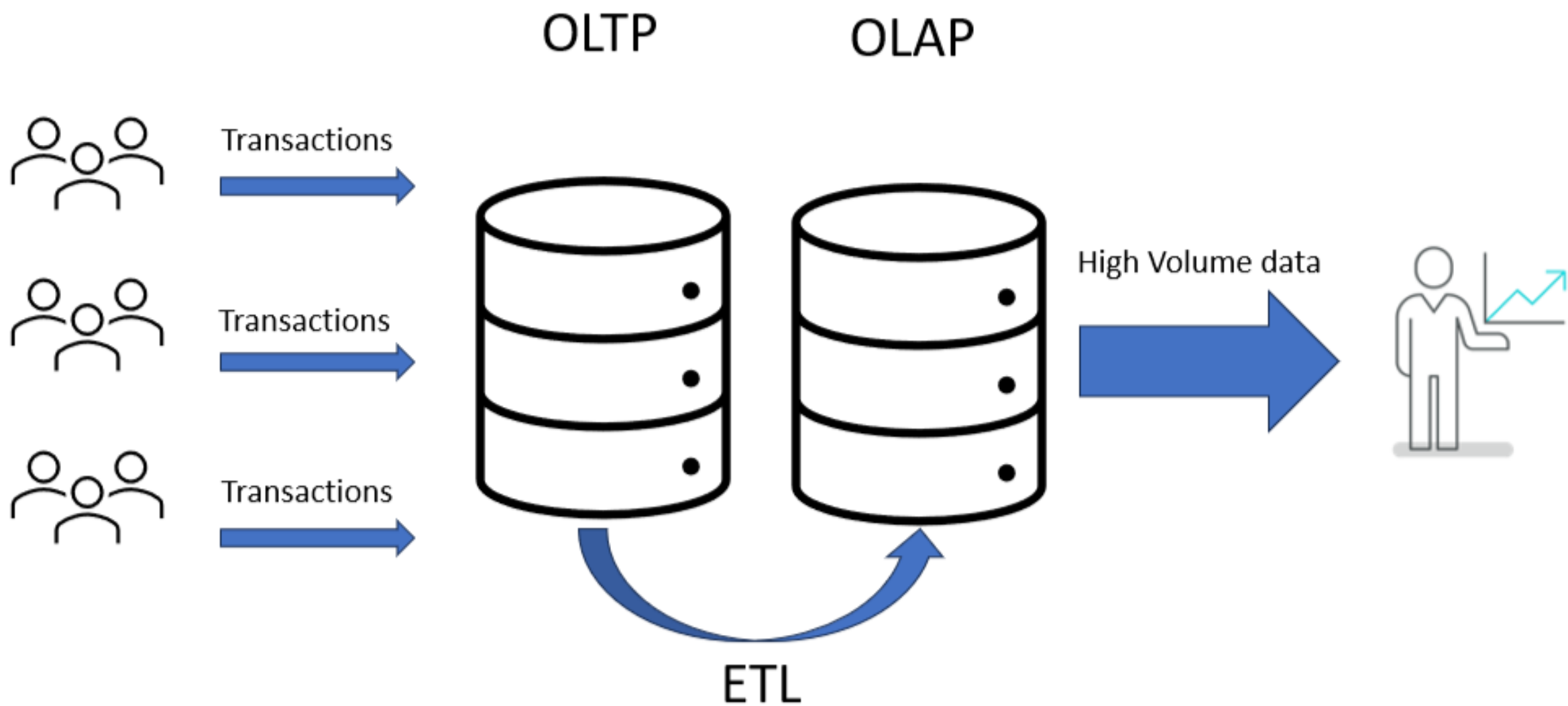
Customers	
customerID	Int
firstName	String
lastName	String
birthDate	Date
moneySpent	Money
anniversary	Date

Products	
productID	Int
category	String
price	Money

Employees	
employeeID	Int
firstName	String
lastName	String
birthDate	Date

Orders	
orderID	Int
customerID	Int
employeeID	Int
productID	Int
orderTotal	Money
orderDate	Date





2. Volumétrie — Penser à 5 ans, pas à aujourd'hui



Question clé

Pourquoi

Volume annuel ?

Anticiper partitioning

Historique consulté ?

Data aging

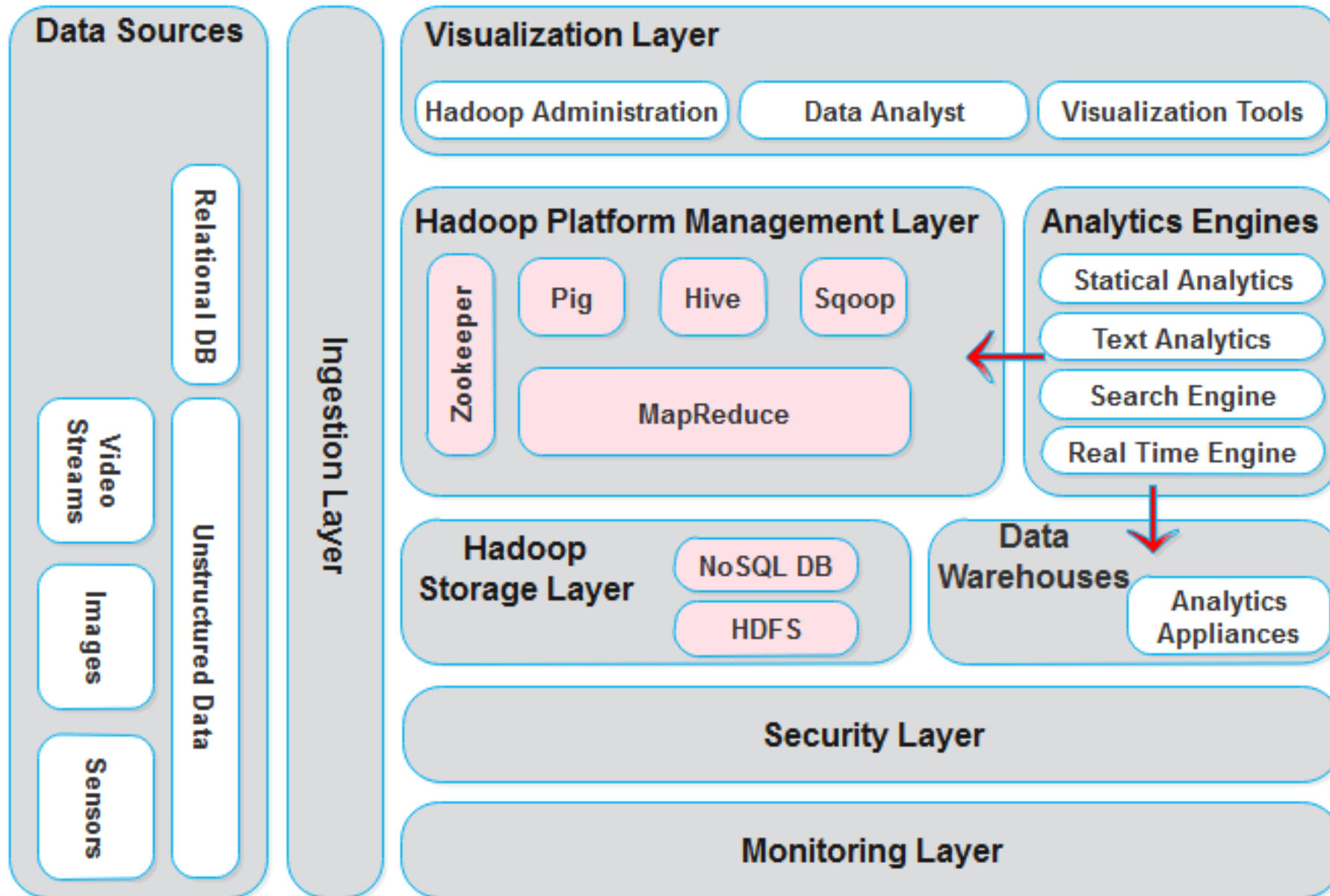
Purge possible ?

Eviter explosion tables

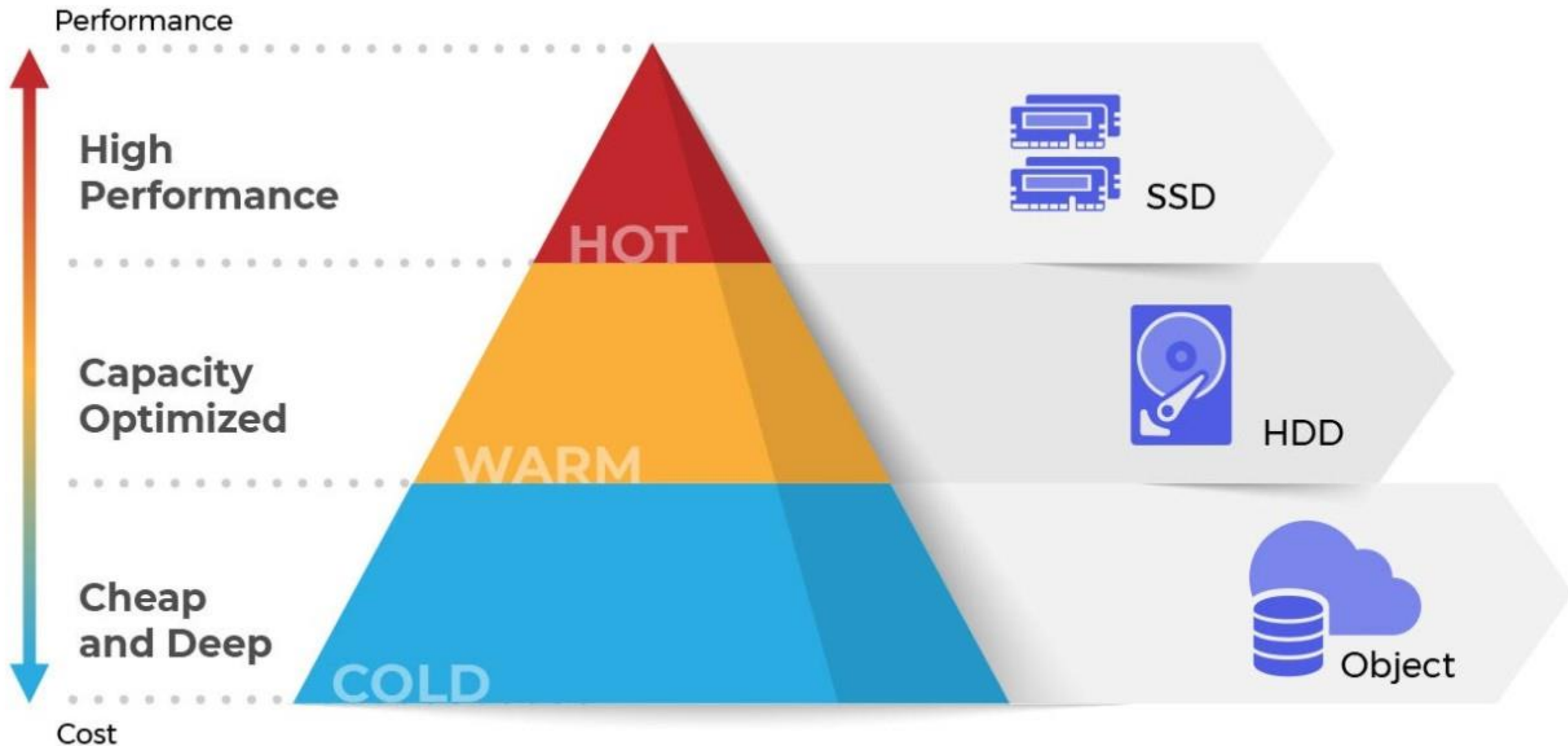
Enjeux

“Une table qui grossit sans stratégie devient un incident en attente.”

Visualization Layer



PERFORMANCE VS COST



3. Partitioning — L'arme secrète du DBA Oracle

Pourquoi partitionner ?

- Réduire I/O
- Maintenance rapide
- Archivage facile
- Requêtes ciblées

Types

Type

Usage

RANGE

Dates

HASH

Distribution charge

LIST

Catégories

COMPOSITE

Range + Hash

Le Partitioning : Principe Fondamental

Le partitionnement consiste à diviser une grosse table en plusieurs morceaux logiques appelés partitions, tout en gardant une seule table pour les applications.

- ➡ Pour l'utilisateur, la table est unique
- ➡ Pour Oracle, elle est découpée intelligemment

Pourquoi c'est crucial ?

Quand une table devient énorme (centaines de millions / milliards de lignes) :

Sans partitioning

Avec partitioning

Full scan massif

Lecture ciblée

Index énormes

Index plus petits

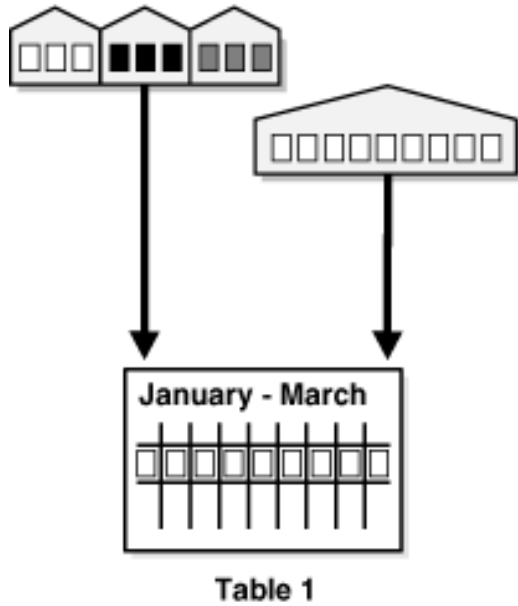
Maintenance lente

Maintenance par morceau

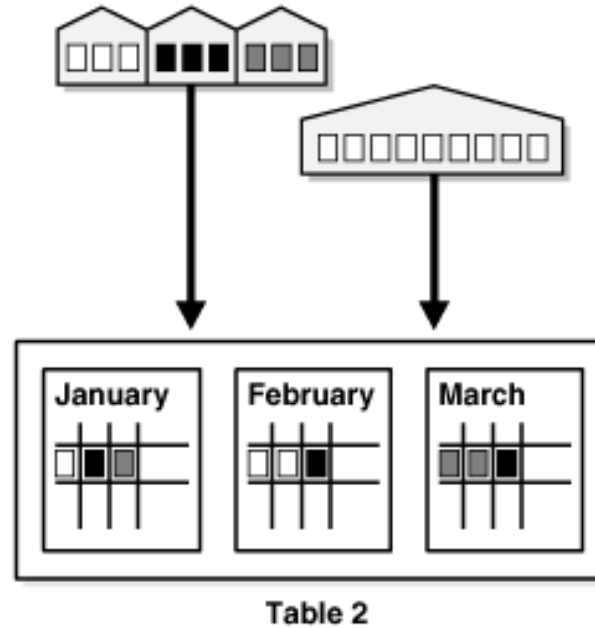
Purge complexe

DROP PARTITION instantané

A nonpartitioned table
can have partitioned or
nonpartitioned indexes.



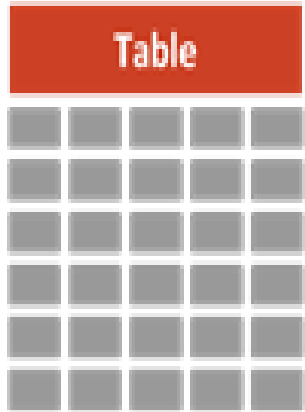
A partitioned table
can have partitioned or
nonpartitioned indexes.



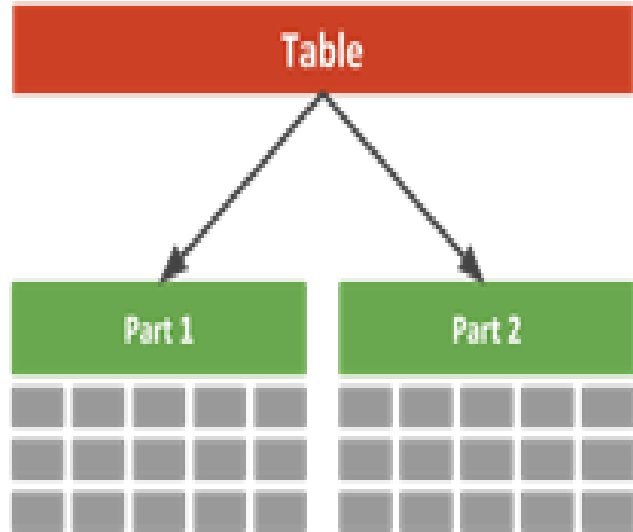
NOPARTITIONED
TABLE /
PARTITIONED TABLE

PARTITIONS AND SUBPARTITIONS

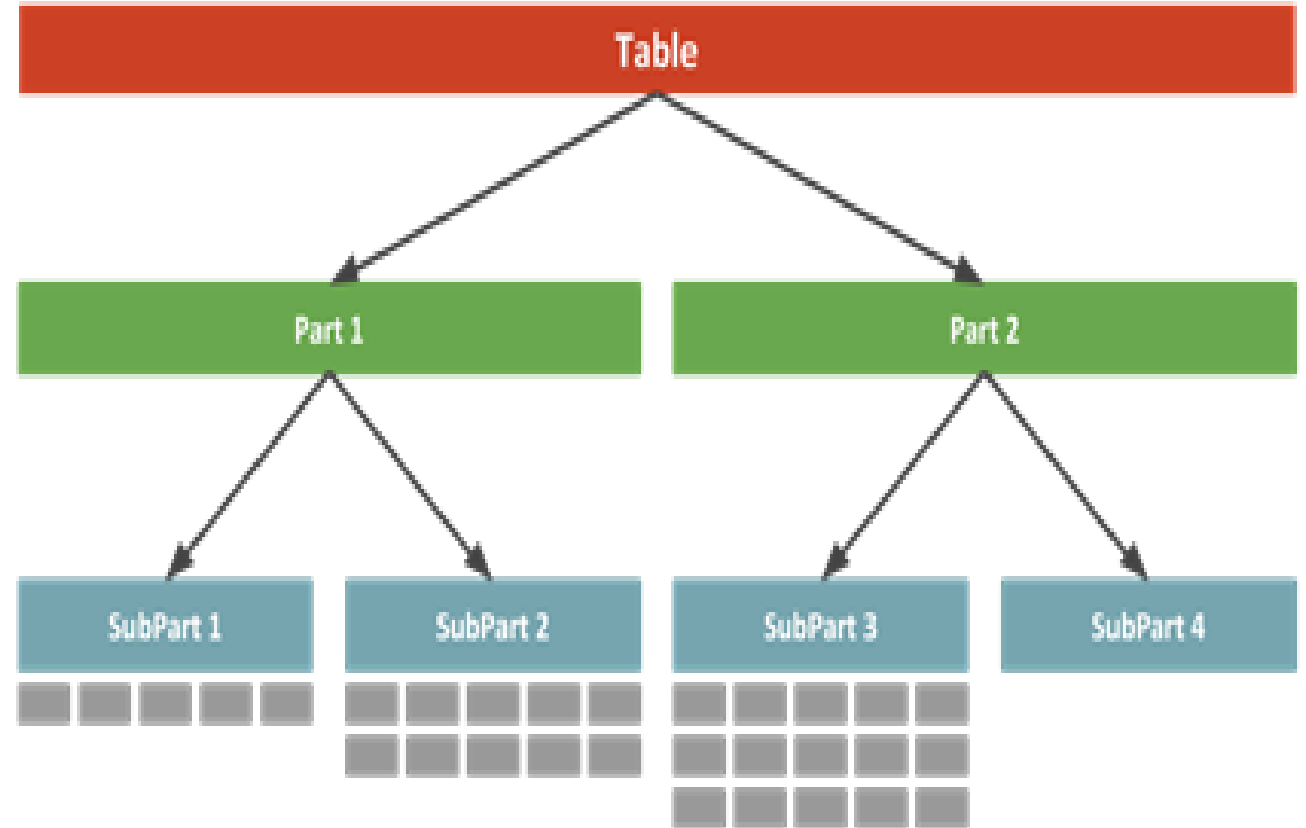
Non-Partitioned



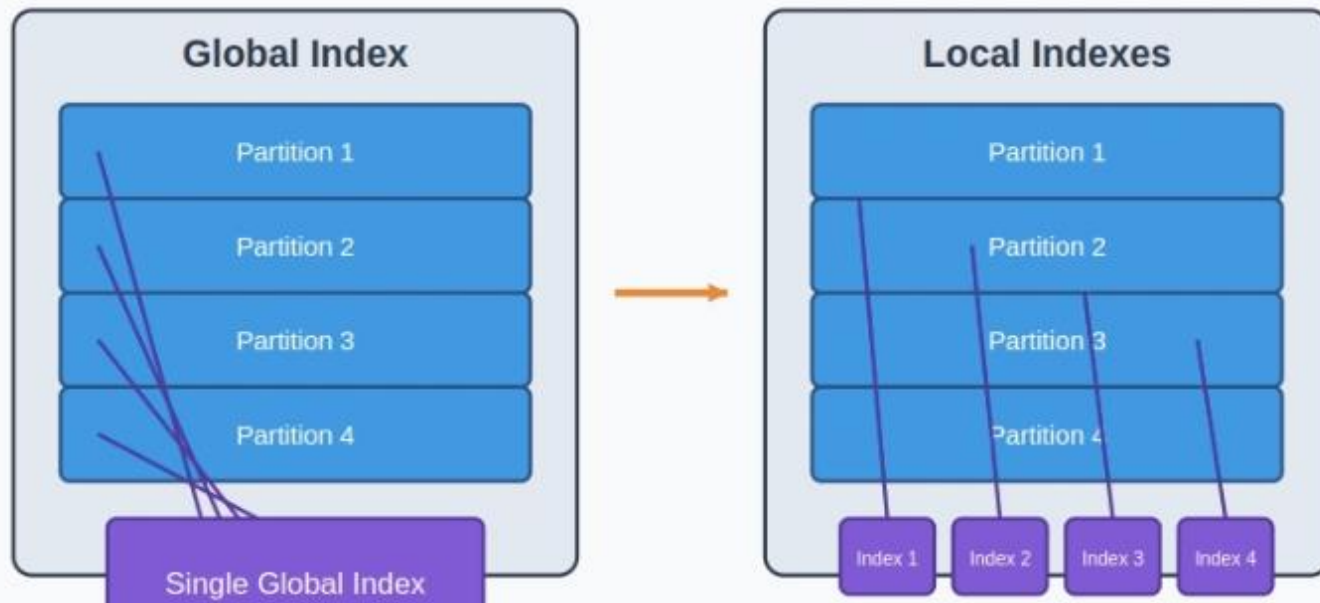
Partitioned



Subpartitioned

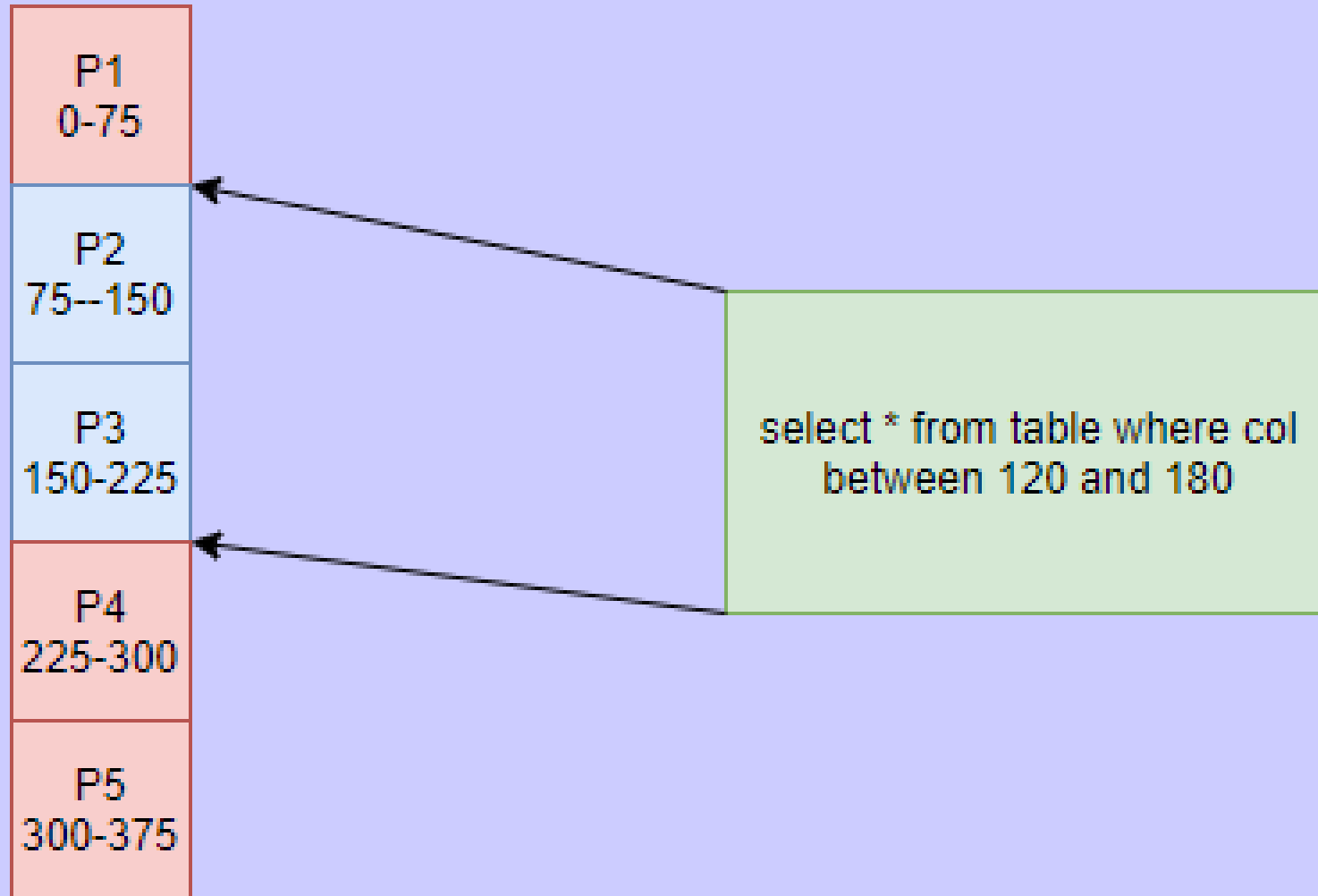


Migrating from Global to Local Indexes in Oracle



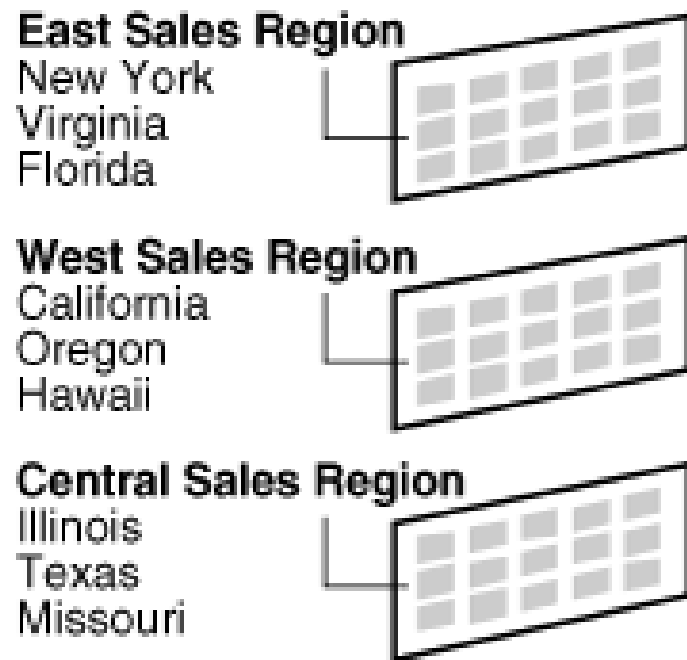
PARTITIONED
INDEXES

ACCES SELECTIF

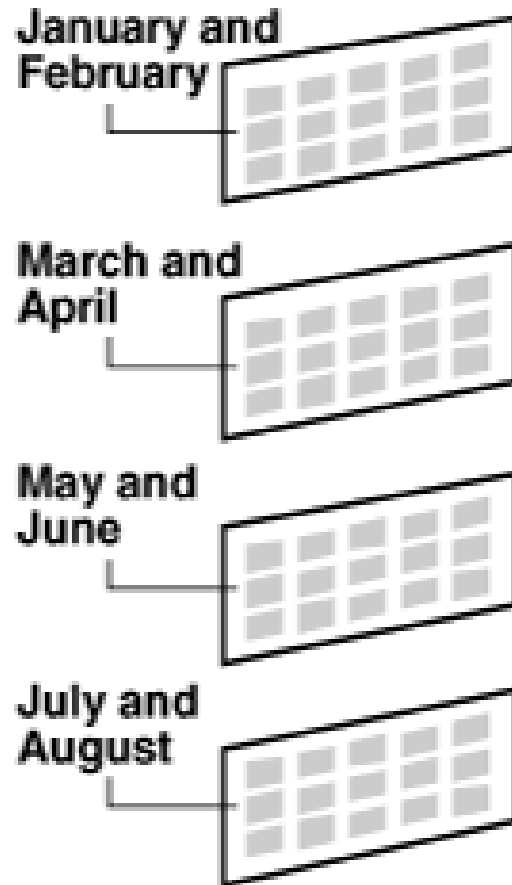


PARTITIONING : AVAILABLE MODES

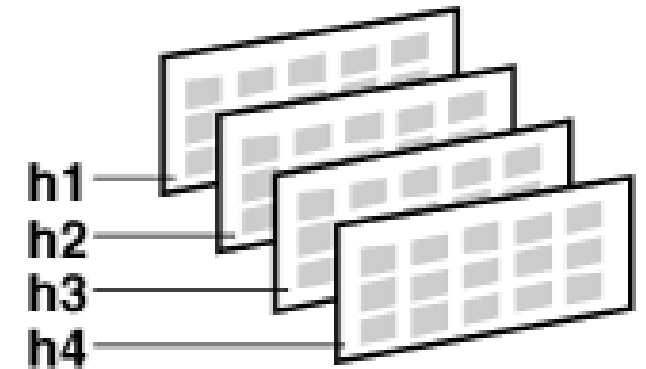
List Partitioning



Range Partitioning



Hash Partitioning



🧠 Pourquoi c'est crucial ?

Quand une table devient énorme (centaines de millions / milliards de lignes) :

Sans partitioning

Avec partitioning

Full scan massif

Lecture ciblée

Index énormes

Index plus petits

Maintenance lente

Maintenance par morceau

Purge complexe

DROP PARTITION instantané

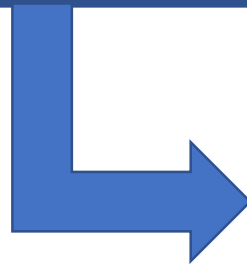
POINTS CLES



Comment Oracle choisit la partition ?

Grâce à une clé de partitionnement, souvent :

- Une date (`order_date`)
- Un identifiant (`region_id`)
- Un type (`status`)



```
CREATE TABLE orders (  
  order_id NUMBER,  
  order_date DATE,  
  amount NUMBER  
)  
PARTITION BY RANGE (order_date) (  
  PARTITION p2024 VALUES LESS THAN (DATE '2025-01-01'),  
  PARTITION p2025 VALUES LESS THAN (DATE '2026-01-01')  
);
```

Le super-pouvoir : Partition Pruning

Quand une requête contient un filtre :

```
SELECT SUM(amount)
FROM orders
WHERE order_date BETWEEN '01-JAN-2025' AND '31-JAN-2025';
```

Oracle ignore toutes les partitions inutiles

👉 Il ne lit que la partition 2025

💬 Résultat :

▮ Lire 1 mois au lieu de 10 ans de données

Domaine	Gain
Performance	Moins d'I/O
Maintenance	Rebuild partiel
Archivage	Drop partition rapide
Backup	Sauvegarde ciblée
Index	Plus petits et rapides

Table = 1,2 milliard de lignes

Situation	Temps requête
Sans partitioning	18 minutes
Avec partitioning par mois	12 secondes

Avantages techniques majeurs

4. Stratégie d'Index

Type d'index

Quand l'utiliser

B-Tree

OLTP classique

Bitmap

Faible cardinalité


Function-based

Expressions

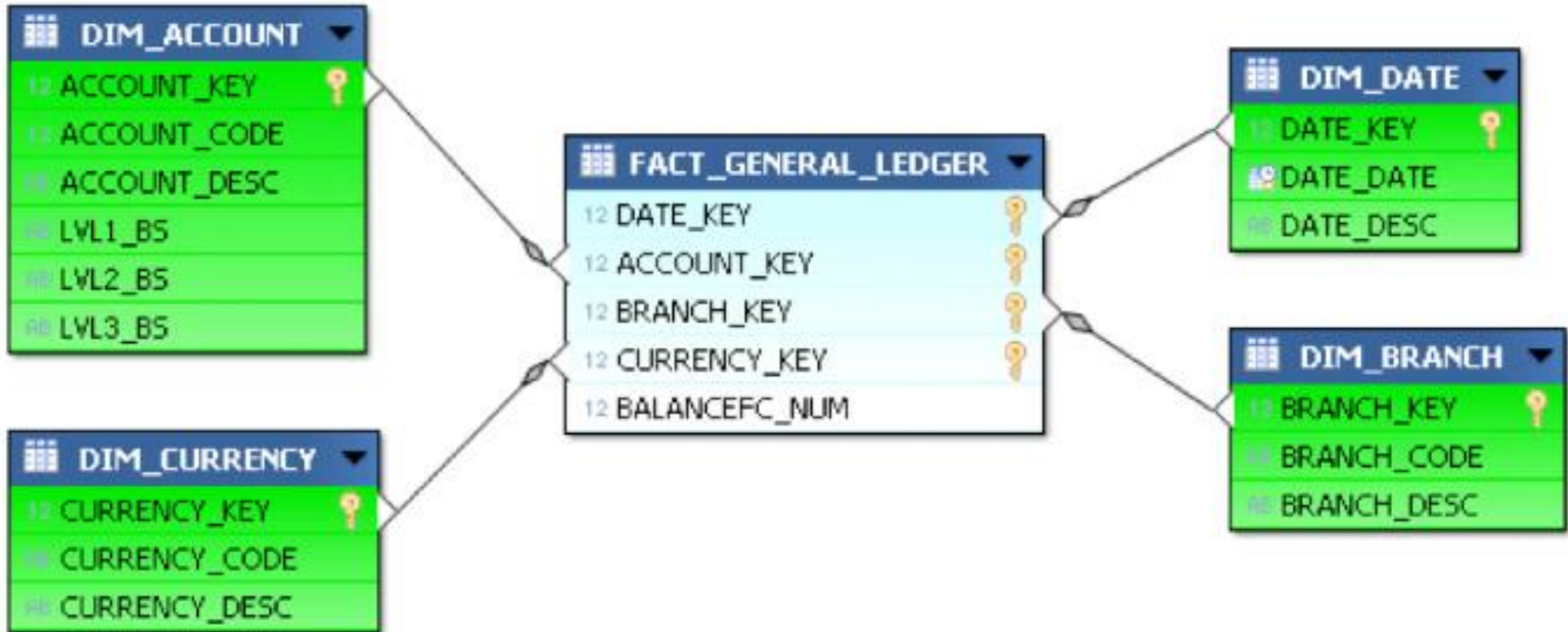
Composite

Filtres multiples

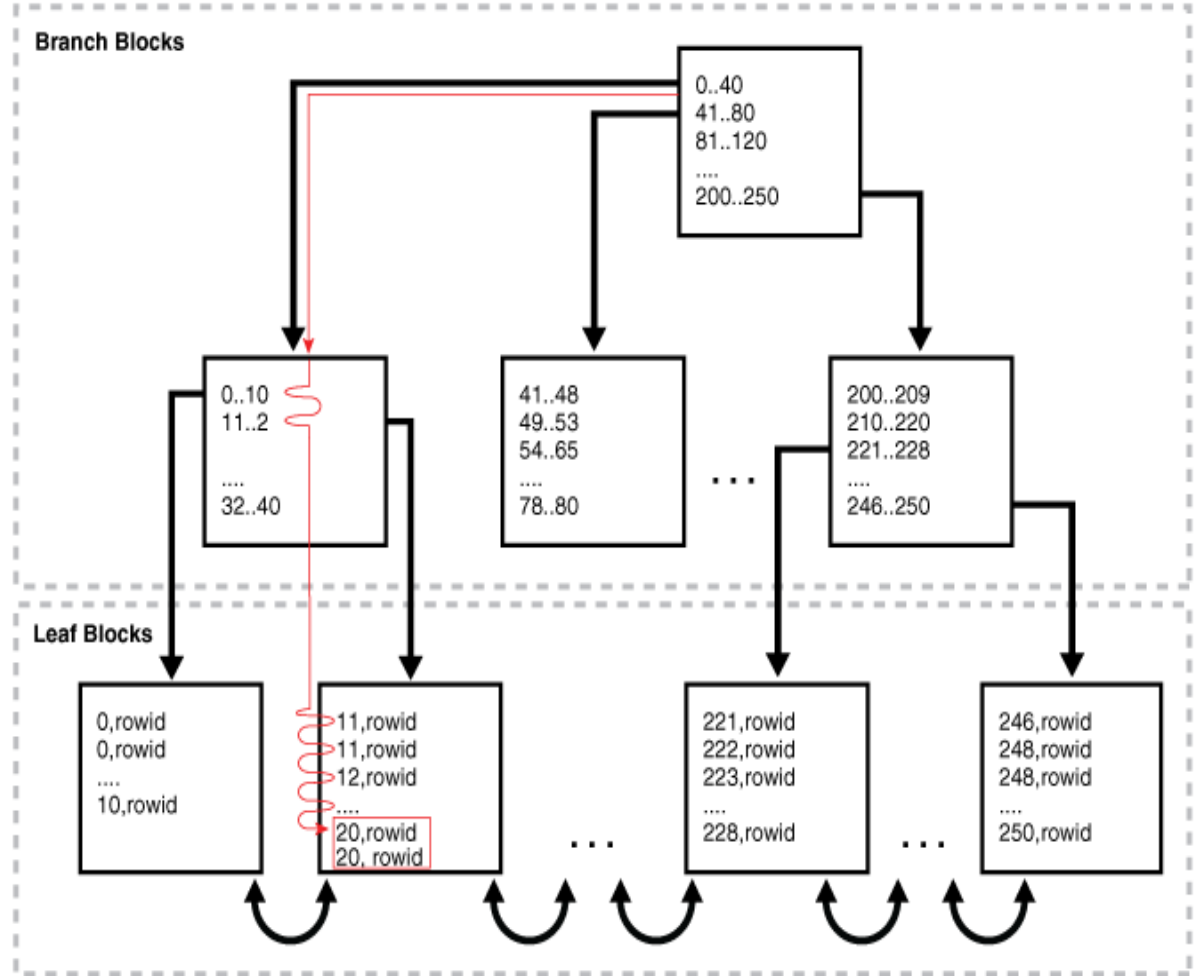
TYPE D'INDEX



EXAMPLE : INDEXING SIMPLE



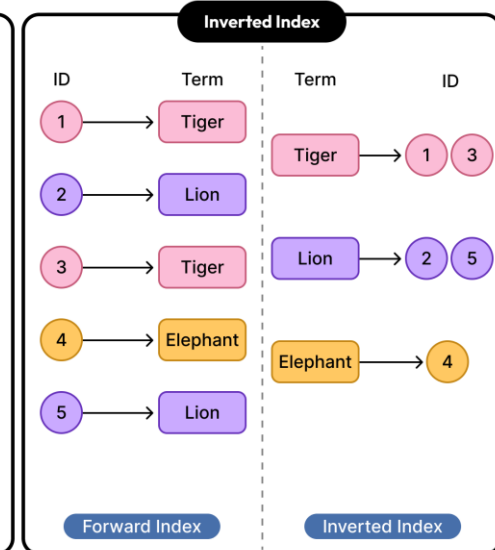
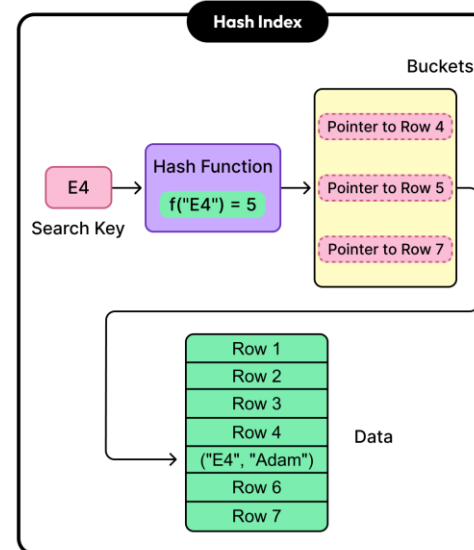
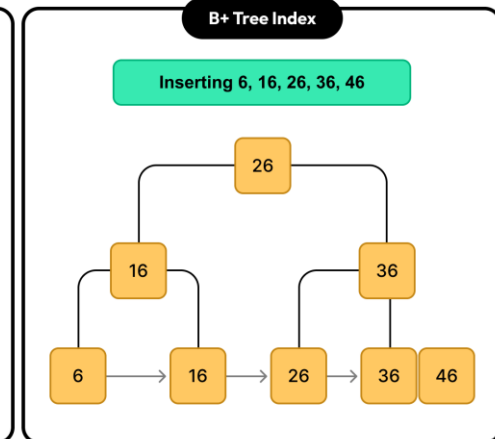
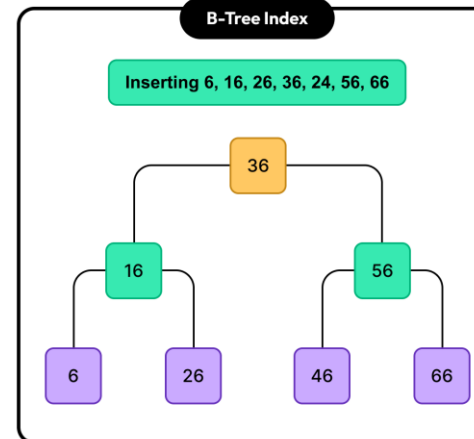
INDEX BRANCHING BLOCKS



INDEX KEY DATA STRUCTURE

Database Index Internals Key Data Structures

ByteByteGo



Trop d'index = INSERT/UPDATE lents

À dire :

“Un index est un accélérateur de lecture... et un frein d'écriture.”

Erreur classique

5. Index Locaux vs Globaux (Partitioned Tables)

A nonpartitioned table can have partitioned or nonpartitioned indexes.

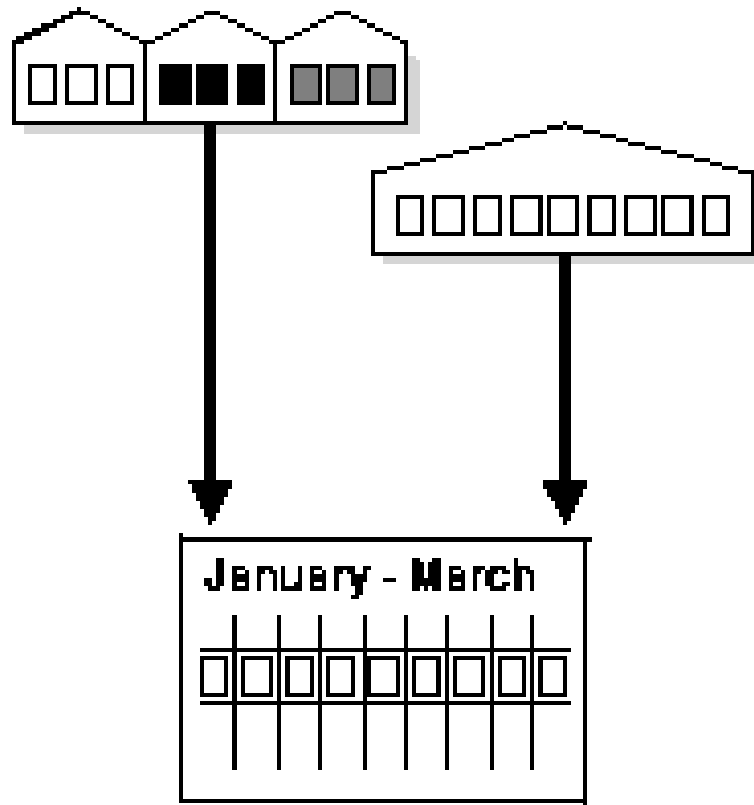


Table 1

A partitioned table can have partitioned or nonpartitioned indexes.

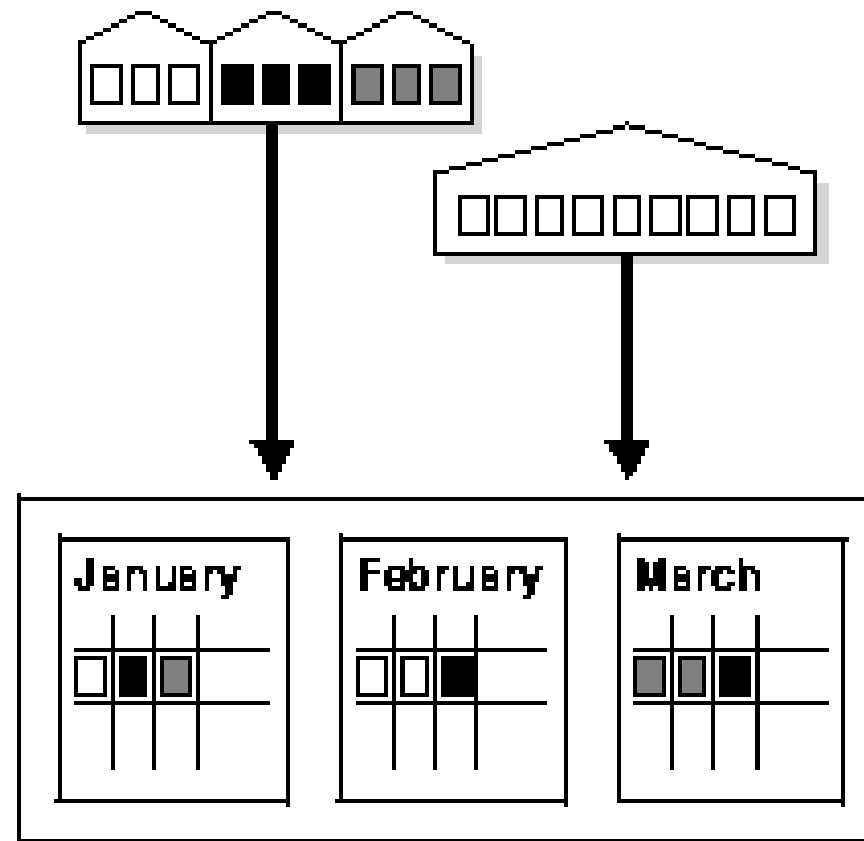


Table 2

6. Data Lifecycle — Hot / Warm / Cold



Données

Stockage

Récentes

SSD

Moyennes

SAN

Anciennes

Archive

BILAN DONNEES STOCKAGE



The Data Lifecycle

Generation

Data is created or acquired from various sources.



Collection

Data is gathered from different sources and prepared for processing.



Processing

Raw data is processed and manipulated to be usable and consistent.



Storage

Processed data is securely stored in databases or data warehouses.



Interpretation

Results are interpreted to inform decision-making and drive actions.



Visualization

Insights are presented in graphical or visual formats for easier interpretation.



Analysis

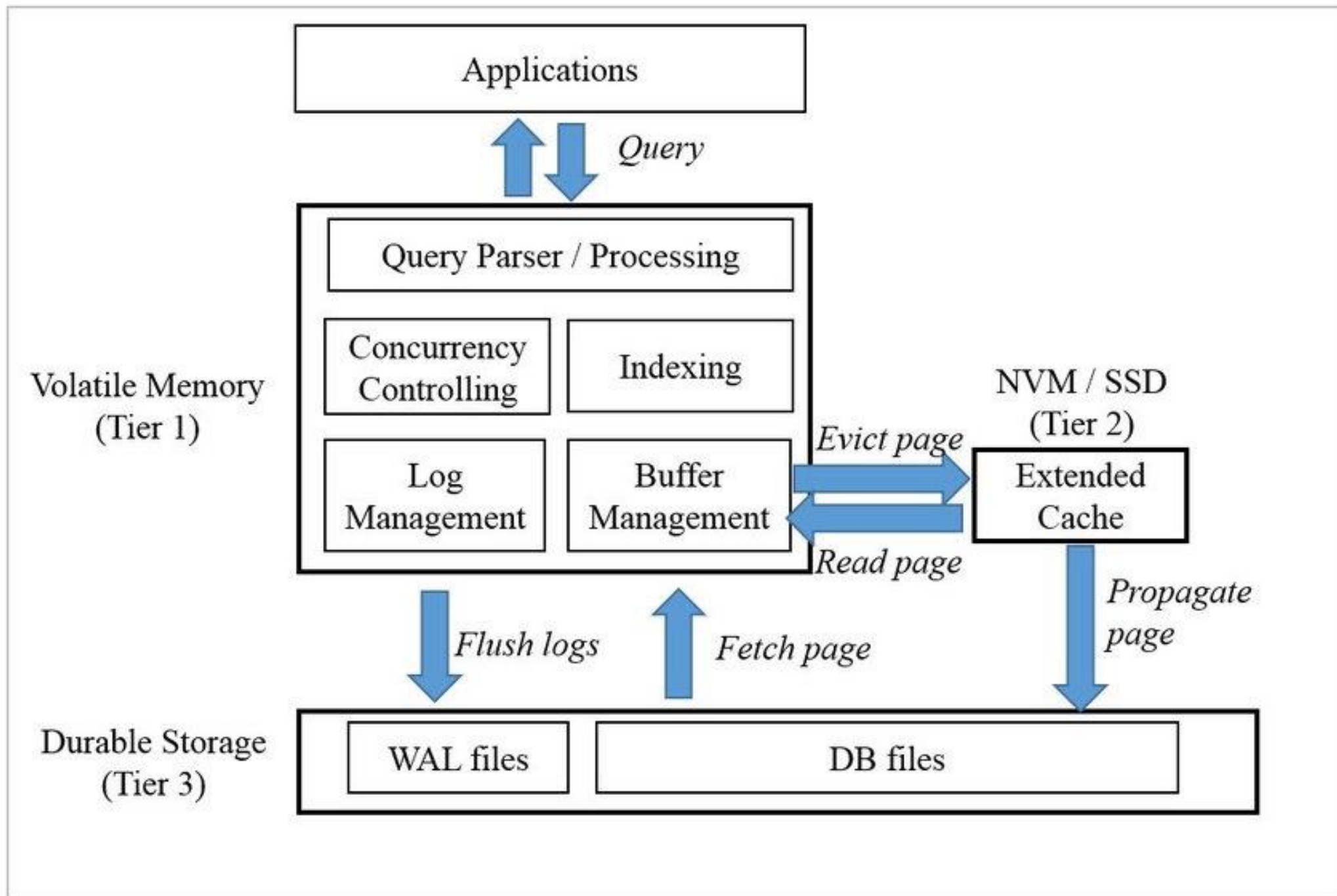
Data is examined to extract insights and patterns.



Management

Data is organized, maintained, and governed to ensure quality and accessibility.





7 Compression & In-Memory

Option	Gain
OLTP Compression	Stockage
HCC	Data warehouse
In-Memory	Scan ultra rapide

8 Erreurs de design les plus coûteuses

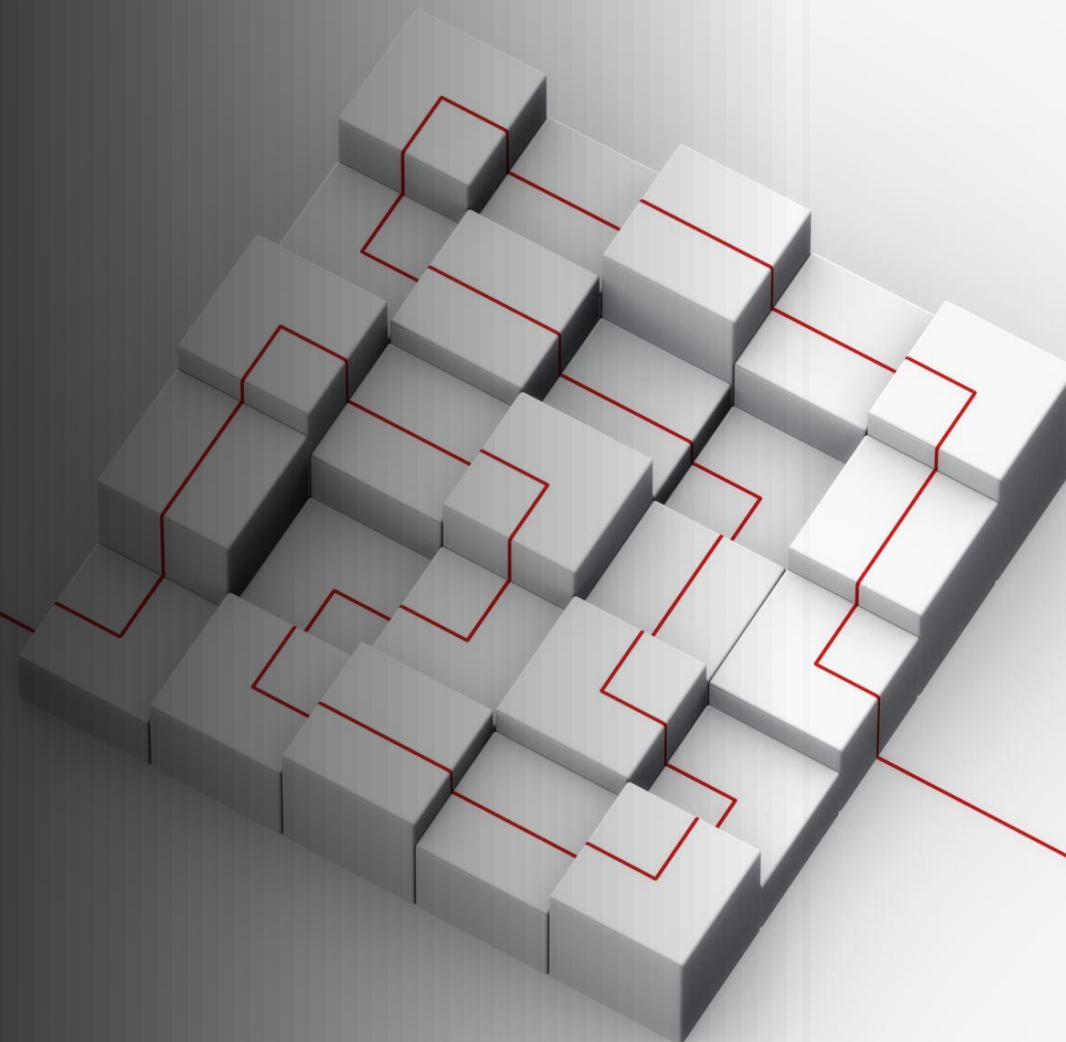
Mauvais choix	Impact
Pas de partitioning	Tables ingérables
Index inutiles	DML lents
Pas de purge	Explosion stockage
Clé primaire mal choisie	Fragmentation

- Normalisation vs performance
- Partitioning (range, hash, interval, composite)
- Index locaux vs globaux
- Compression, In-Memory option
- Data lifecycle (hot/warm/cold)





5 Sécurité Oracle



5 – SECURITE ORACLE

- 1. Les 4 piliers de la sécurité Oracle
- 2. TDE — Transparent Data Encryption
- 3. Auditing — Savoir qui a fait quoi
- 4. VPD — Virtual Private Database
- 5. Data Redaction
- 6. Gestion des privilèges — Le principe clé
- 7. Séparation des rôles (SoD)
- 8. Sécurité réseau

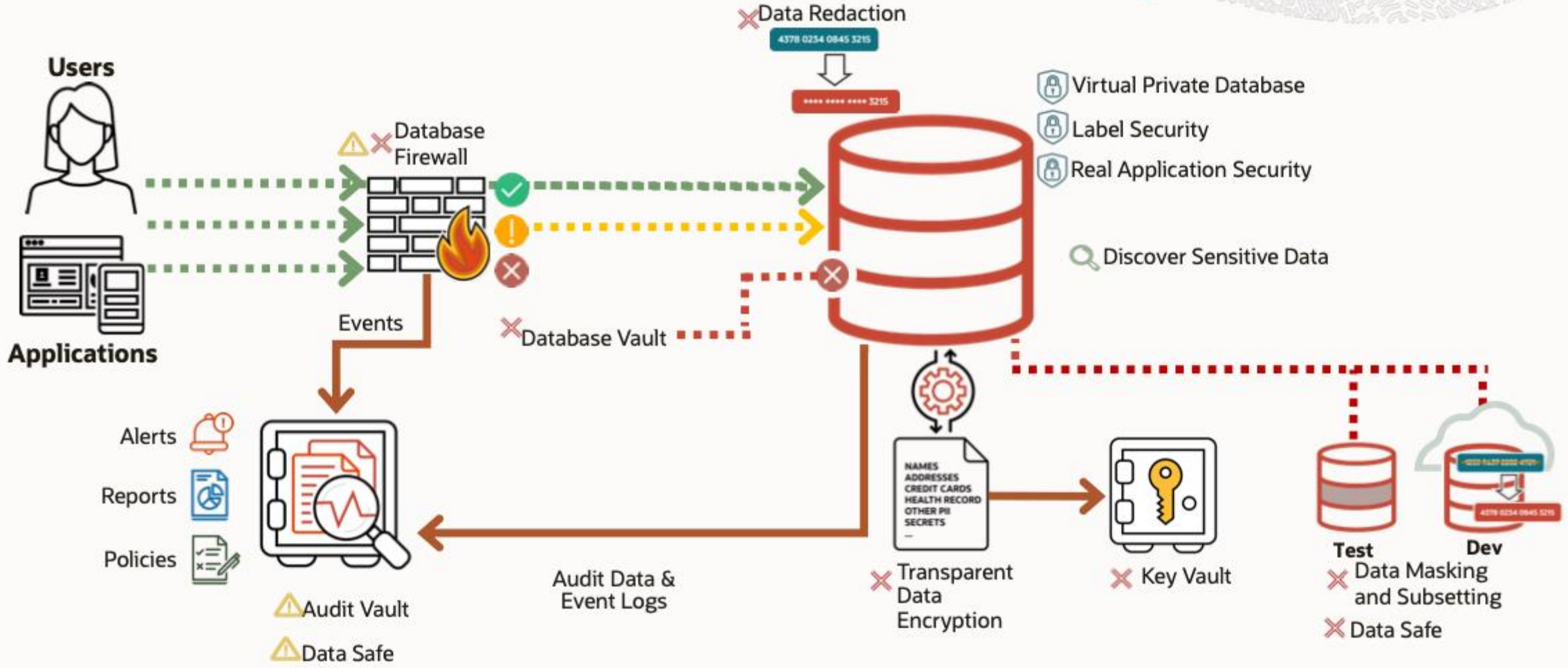


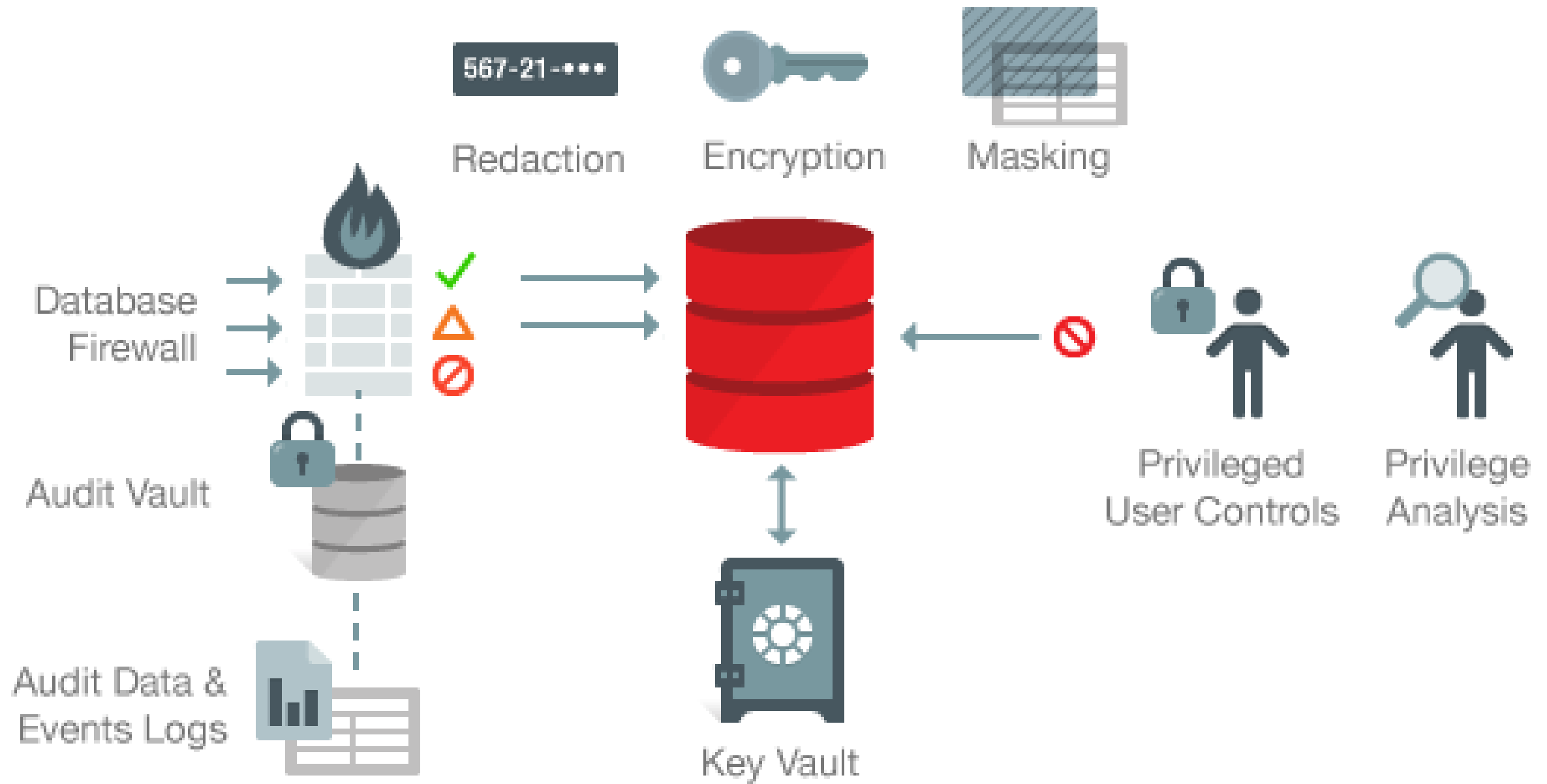
1. Les 4 piliers de la sécurité Oracle



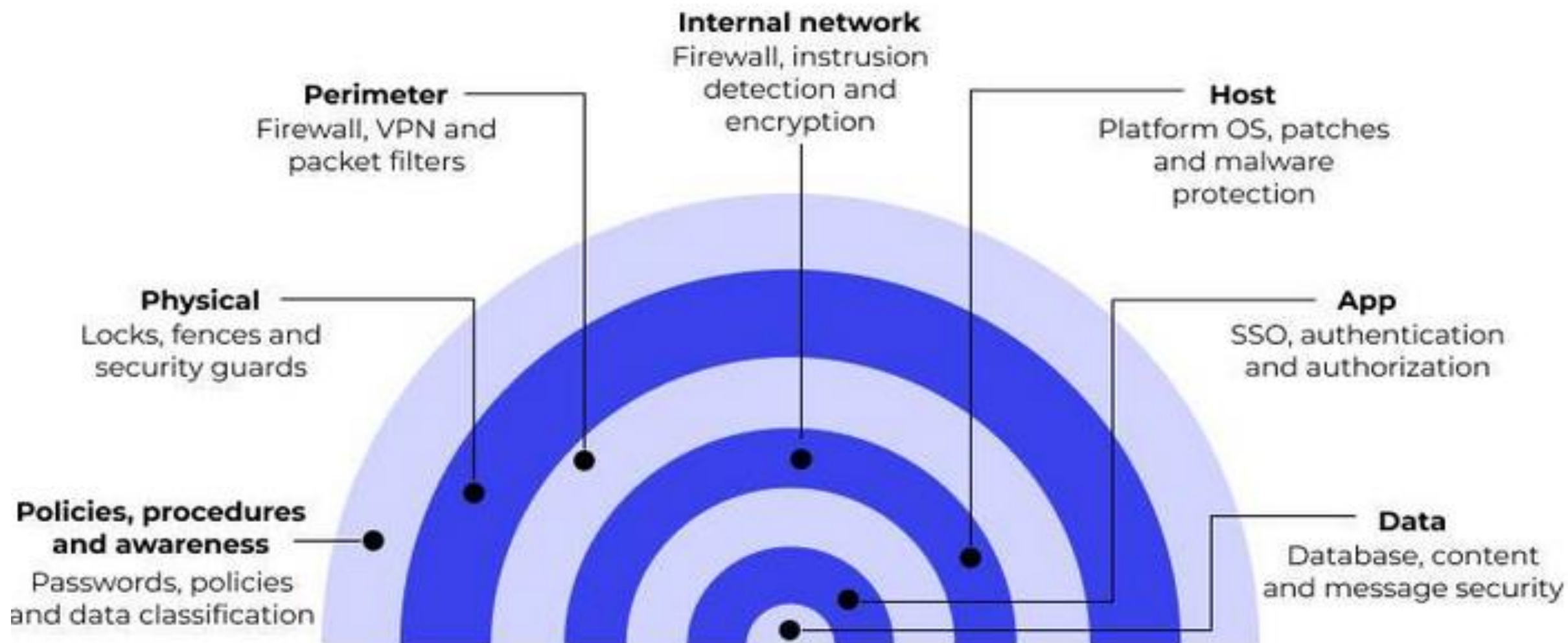
Maximum Security Architecture

Key to Database Security Controls



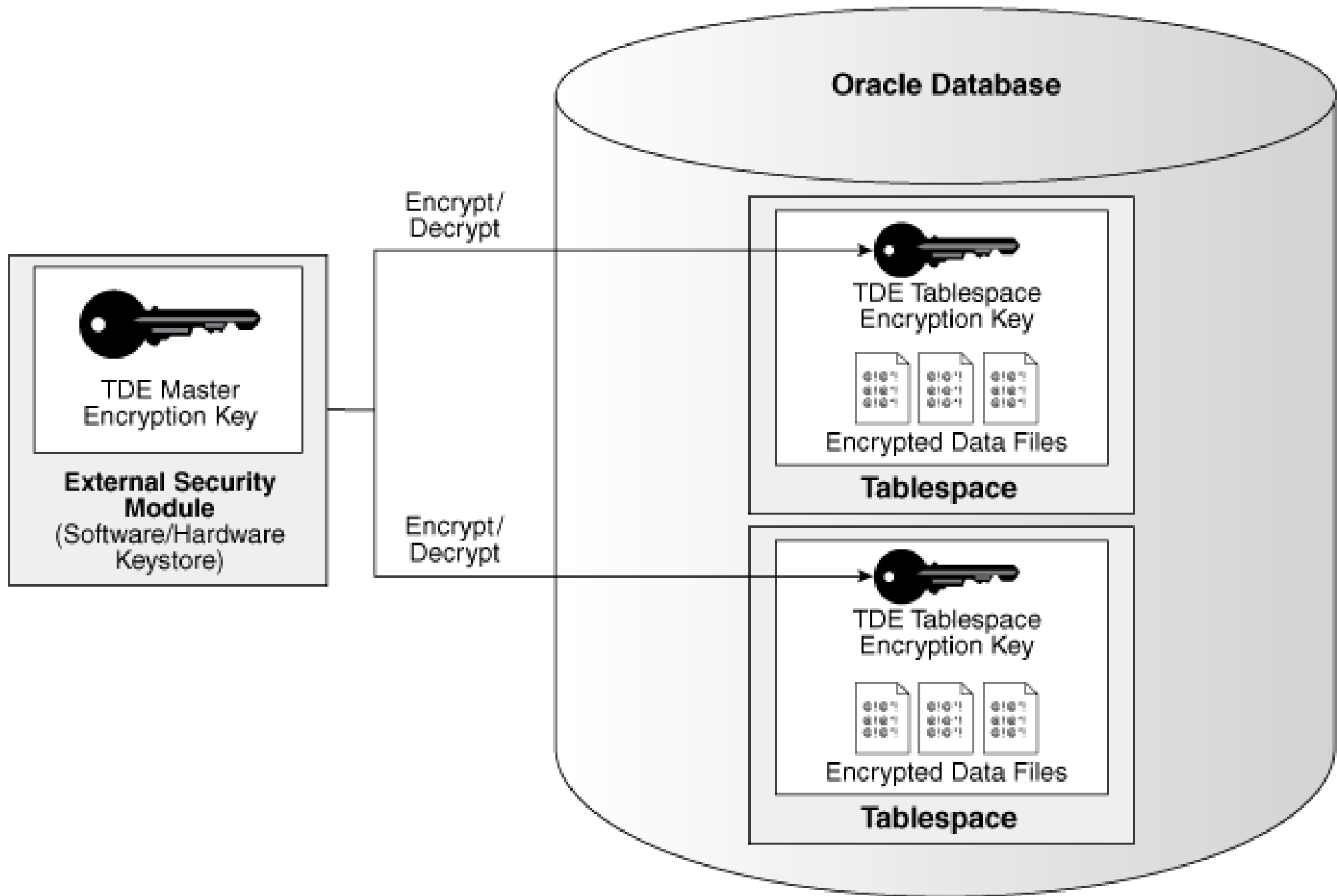


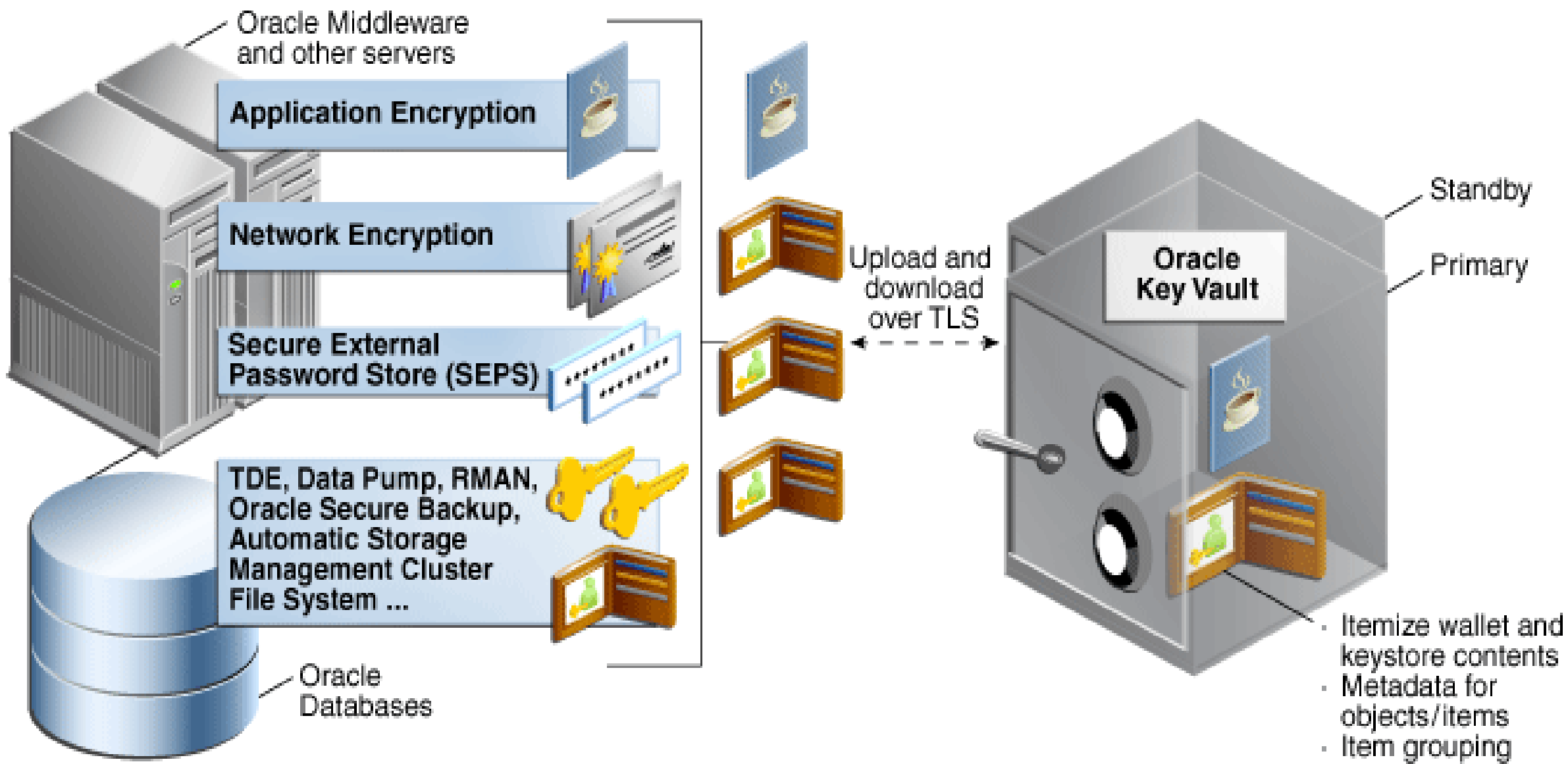
Defence-in-depth layers

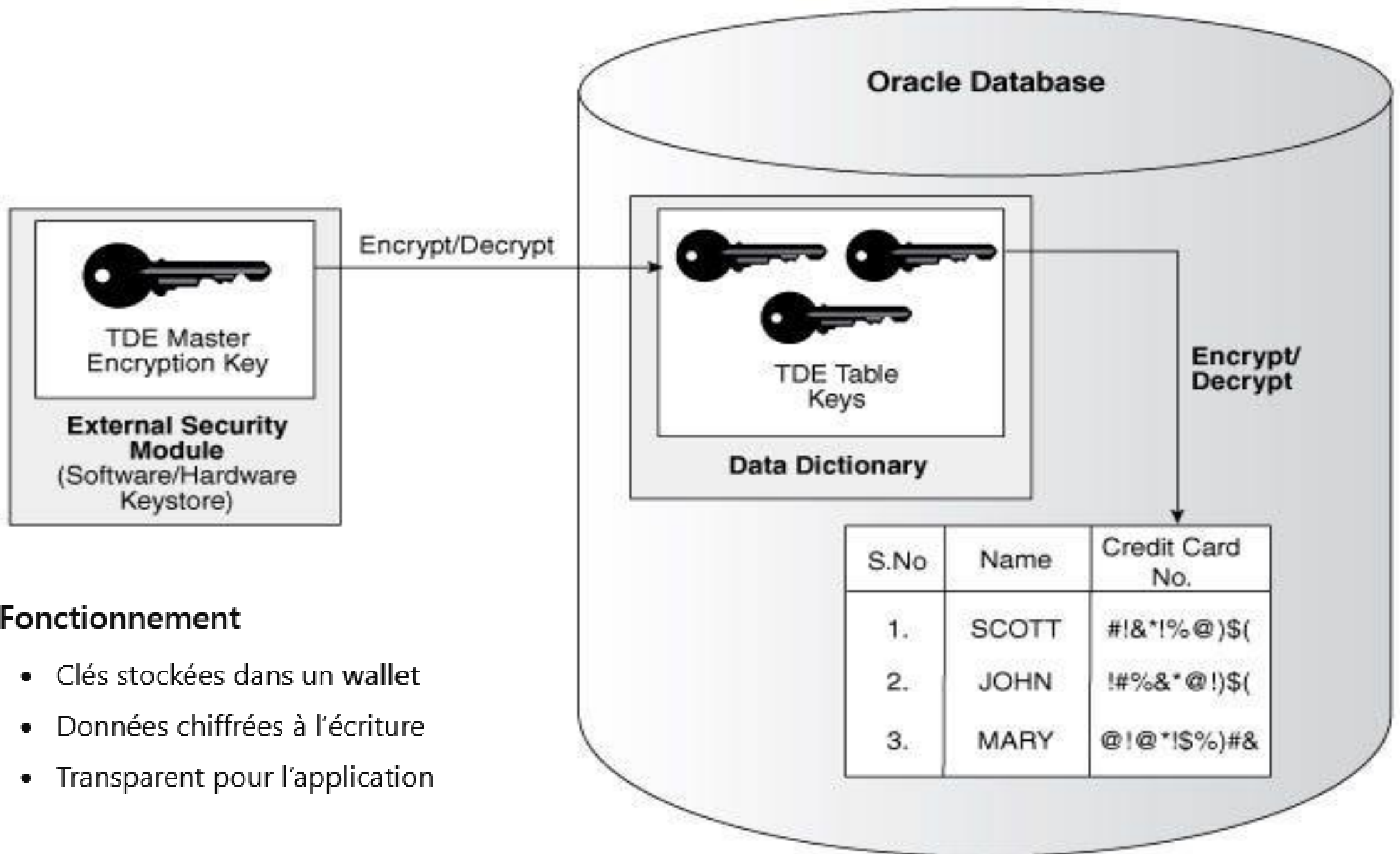


2. TDE — Transparent Data Encryption







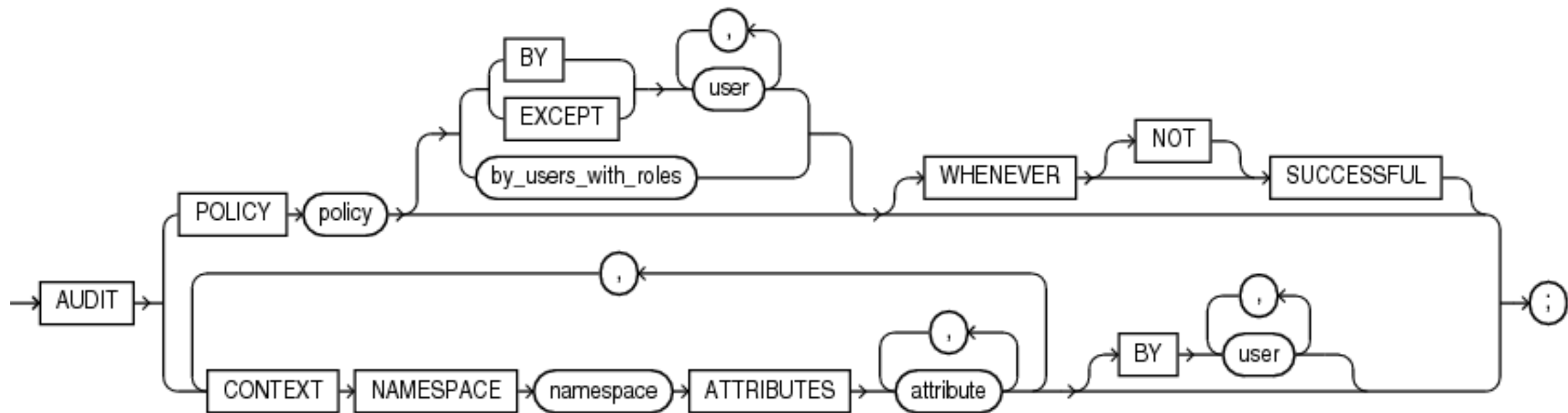


Fonctionnement

- Clés stockées dans un wallet
- Données chiffrées à l'écriture
- Transparent pour l'application

3. Auditing — Savoir qui a fait quoi





Search

Results

Filter

Show Records Where

Show All Records

contains the text

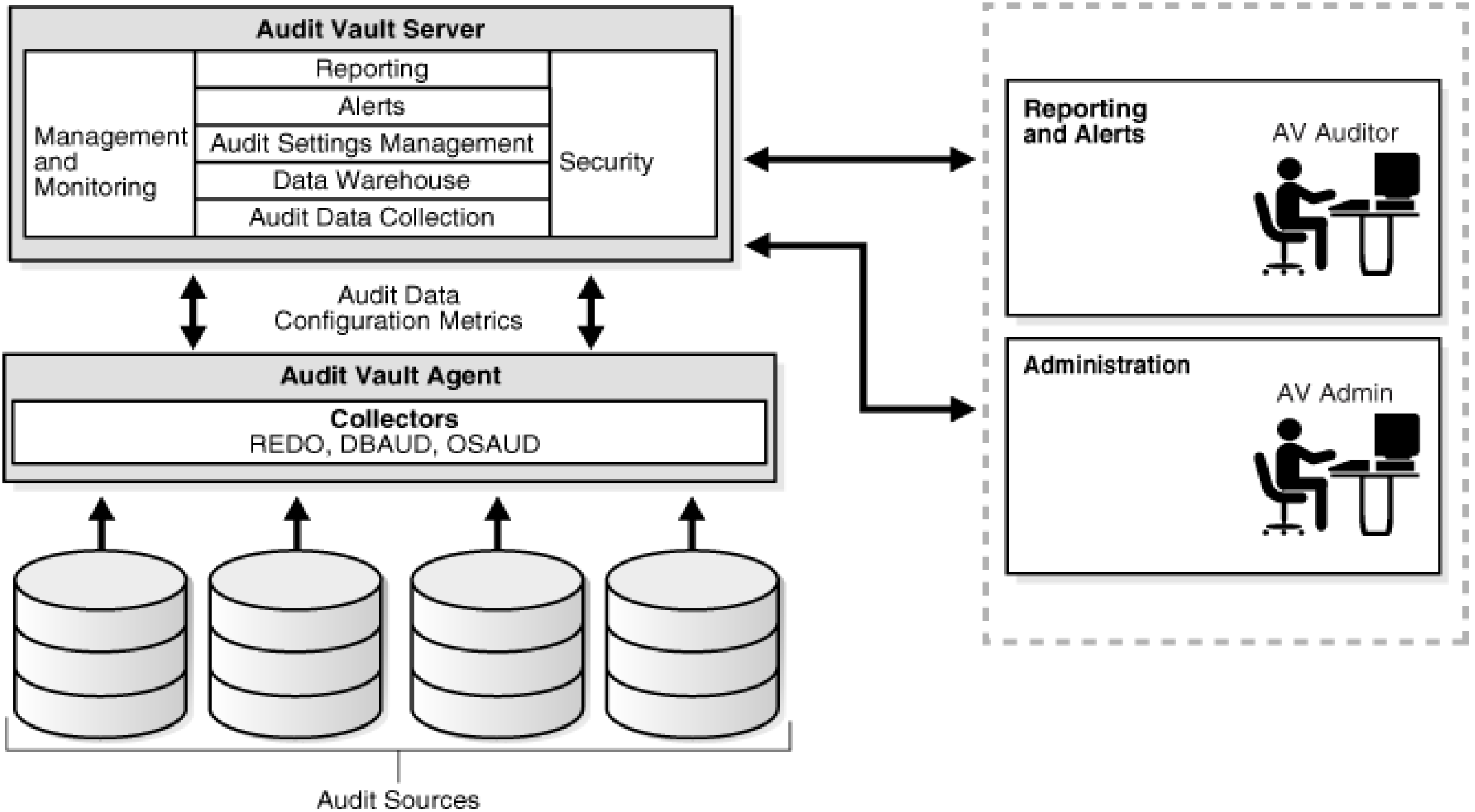
Filter Now

[Clear Filters](#)[... Clear and Run](#)

#	Audit Time	Emp #	Emp Name	RVC #	RVC Name	Application	Module	Operation	Object Number	Field
715080	10/19/2015 8:55:33 AM	90001	MICROS,			EMC	Distributed CAL	Delete	1	
715081	10/19/2015 8:55:33 AM	90001	MICROS,			EMC	Workstation DB Credentials	Edit		Admin Password Modified Date
715078	10/19/2015 8:54:32 AM	90001	MICROS,			EMC	Distributed CAL	Add	1	
715079	10/19/2015 8:54:32 AM	90001	MICROS,			EMC	Workstation DB Credentials	Edit		Database Password Modified Date
715077	10/19/2015 8:48:30 AM	90001	MICROS,			EMC	Workstation DB Credentials	Edit		Admin Password Modified Date
715076	10/19/2015 8:48:29 AM	90001	MICROS,			EMC	Distributed CAL	Delete	1	
715073	10/19/2015 8:41:46 AM	90001	MICROS,			EMC	Distributed CAL	Add	1	
715075	10/19/2015 8:41:46 AM	90001	MICROS,			EMC	Workstation DB Credentials	Edit		Database Password Modified Date
715074	10/19/2015 8:41:46 AM	90001	MICROS,			EMC	Workstation DB Credentials	Edit		Admin Password Modified Date
715071	10/19/2015 8:38:15 AM	90001	MICROS,			EMC	Workstation DB Credentials	Edit		Admin Password Modified Date
715072	10/19/2015 8:38:15 AM	90001	MICROS,			EMC	Workstation DB Credentials	Edit		Database Password Modified Date
715070	10/19/2015 8:38:14 AM	90001	MICROS,			EMC	Distributed CAL	Delete	1	
715066	10/19/2015 8:35:45 AM	90001	MICROS,			EMC	Distributed CAL	Add	1	
715067	10/19/2015 8:35:45 AM	90001	MICROS,			EMC	Workstation DB Credentials	Edit		SysParmSecurityTab.EncryptionKeyID
715068	10/19/2015 8:35:45 AM	90001	MICROS,			EMC	Workstation DB Credentials	Edit		Admin Password Modified Date

Formatted Results

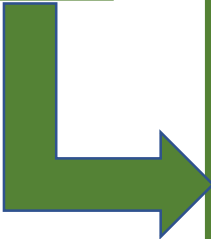
Save to Disk



Unified Auditing (moderne)

Permet de tracer :

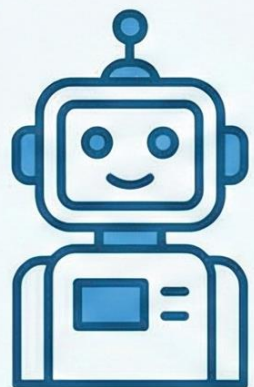
- Connexions
- Accès aux tables sensibles
- Actions DBA



```
CREATE AUDIT POLICY audit_hr  
ACTIONS SELECT ON hr.employees;  
  
AUDIT POLICY audit_hr;
```

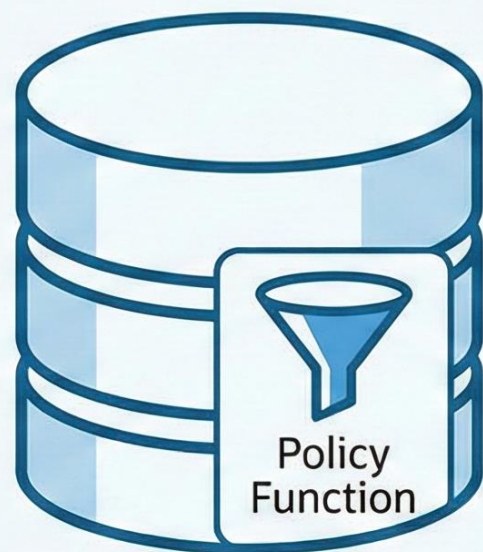
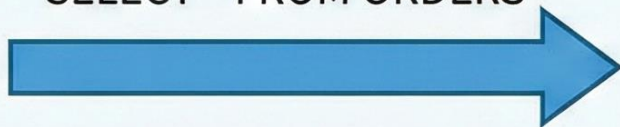
“En sécurité, ce qui n’est pas audité n’existe pas.”

4. VPD — Virtual Private Database



AI Agent

SQL Query:
SELECT * FROM ORDERS



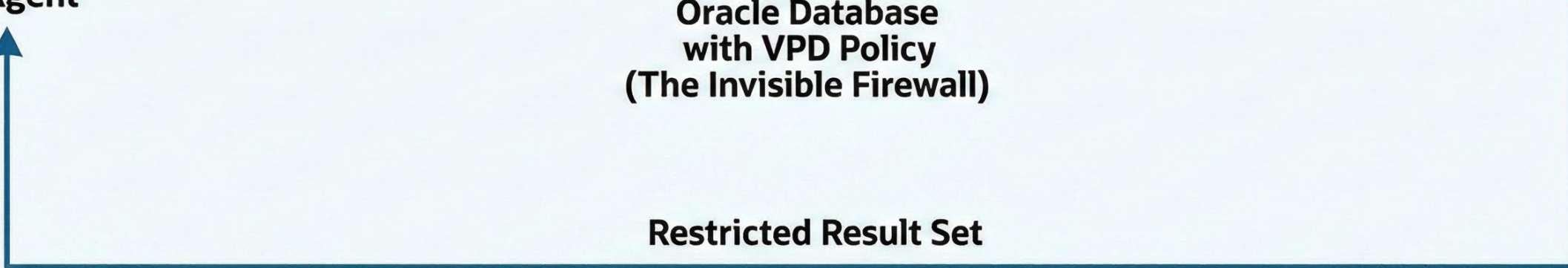
**Oracle Database
with VPD Policy
(The Invisible Firewall)**

Rewritten Query:
SELECT *
FROM ORDERS
WHERE
tenant_id = 'TENANT_A'



Filtered Data

Restricted Result Set



Dashboard Request to Oracle BI Server

```
SELECT
  Employee.Name saw_0,
  Customer.Customer saw_1
FROM Sales
ORDER BY saw_0, saw_1
```

Oracle BI Server-Generated SQL to Data Source

```
select distinct
  T122.SALESREP as c1,
  T122.NAME as c2
from
  D1_CUSTOMER2 T122
order by c1, c2
```

User =
'Administrator'

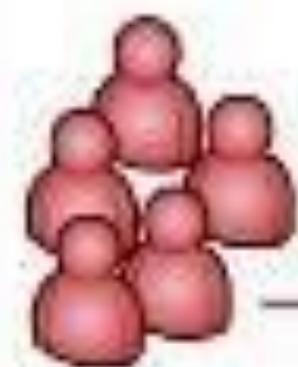


Employee Name	Customer Name
Angela Richards	Ben Chin
	David Sunder
	Ethan Pappayliou
	Janette Dudley
	Kei Okuda
Mark Stapley	
Anne Green	Jean Mackenzie
	Walter Joachim
Aurelio Miranda	Ben Chin
	David Sunder
	Ethan Pappayliou
	Kei Okuda
Mark Stapley	
Bob Grant	Debbie Walls
Charles Brooks	Jeff Kr

User =
'Anne Green'



Employee Name	Customer Name
Anne Green	Jean Mackenzie
	Walter Joachim



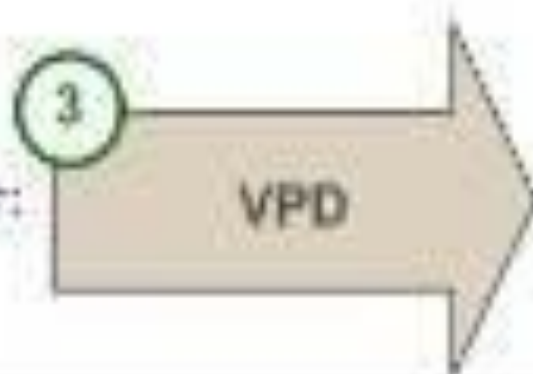
1

Client Name	Client ID
BIG BUBBLE COMPANY	123
CHEW IT ENTERPRISES	456

2

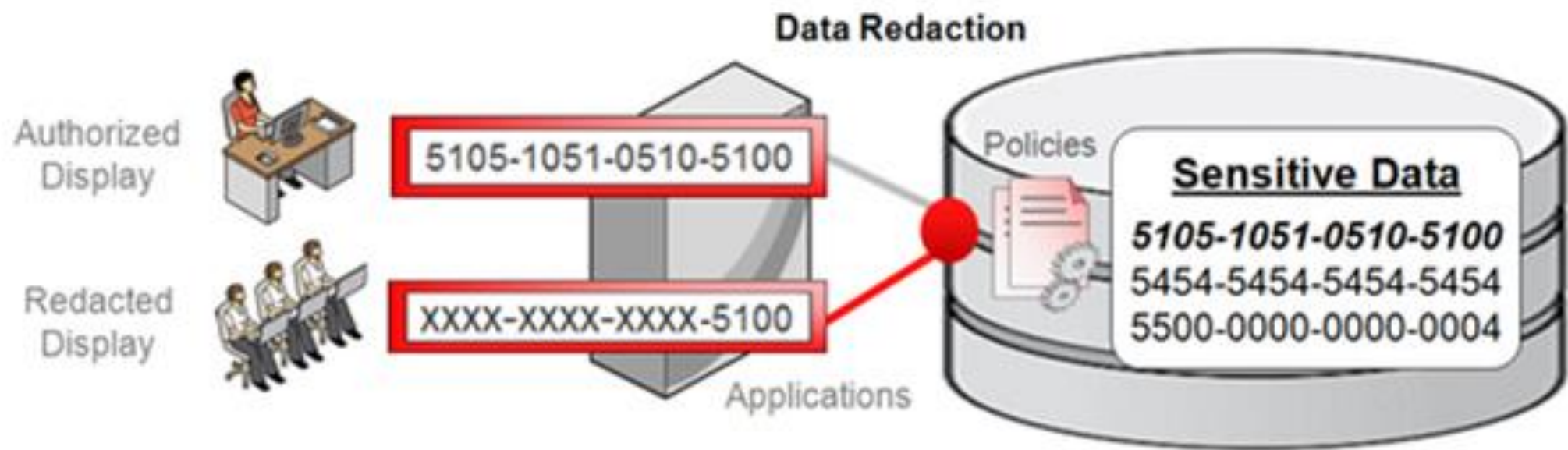
Client ID	Customer Name
123	The Gum Shop
123	Jane's Candy
456	Sweet Tooth
123	Shannon's Pharmacy
456	Gum Emporium

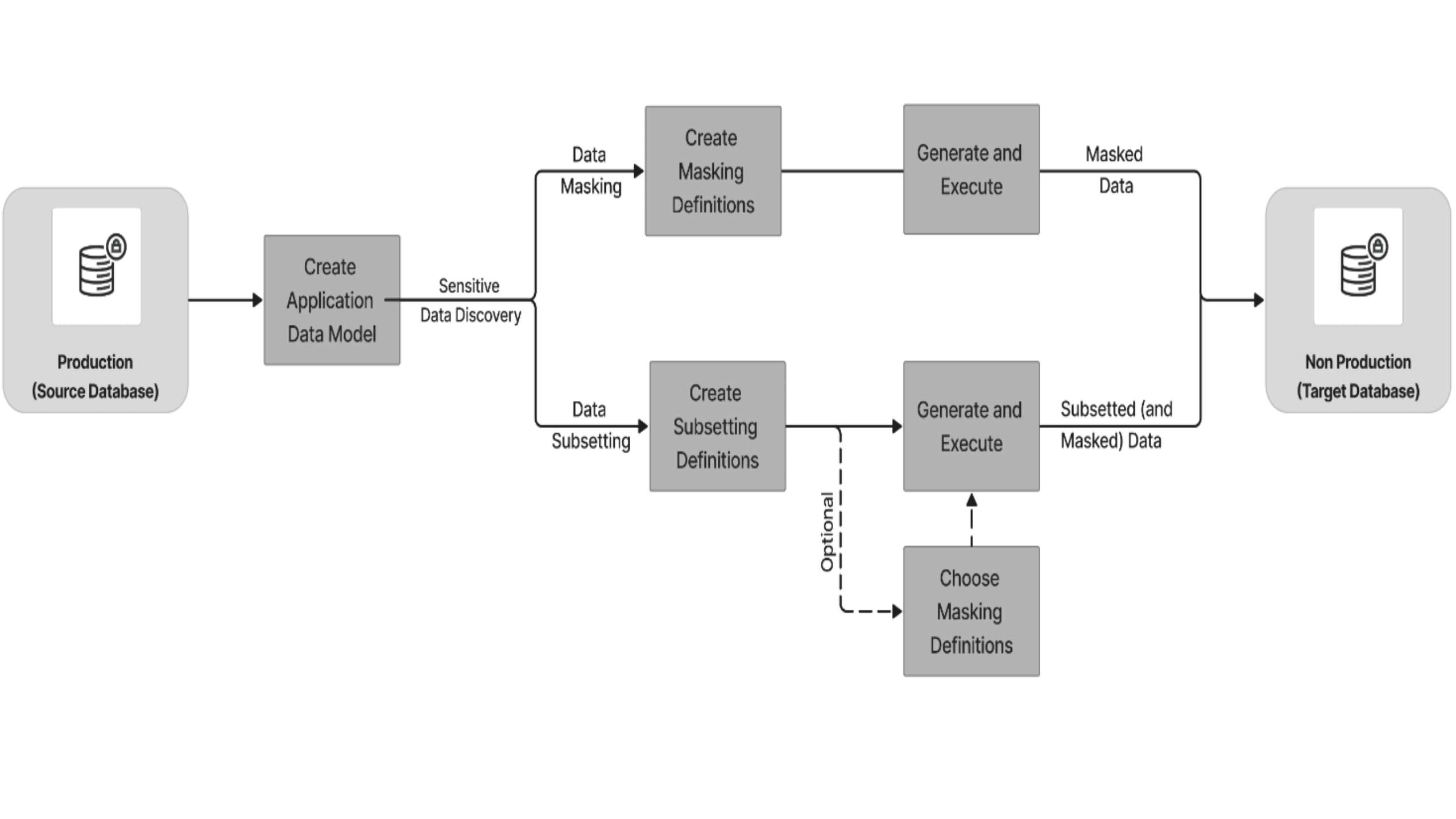
Select * from customer:



Select * from customer where client_id = 123;
or
Select * from customer where client_id = 456;

5. Data Redaction



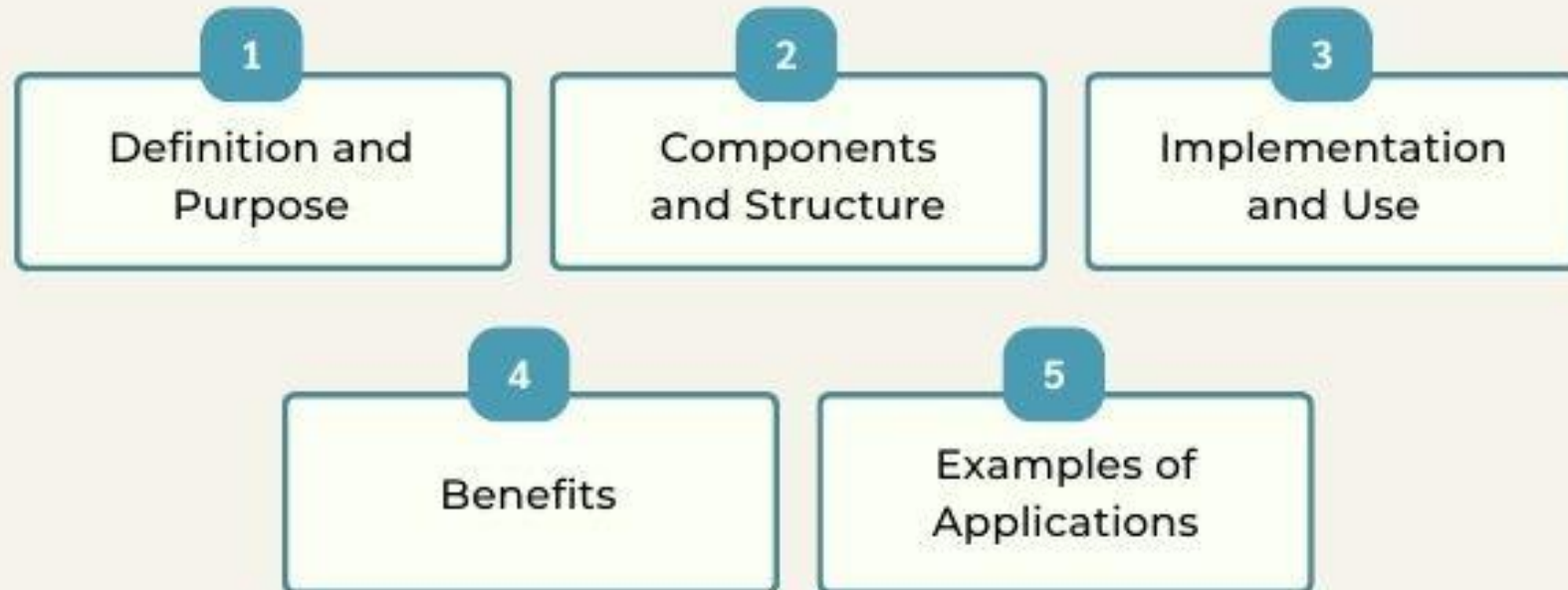


7. Séparation des rôles (SoD)



Five key points about A SEGREGATION OF DUTIES MATRIX

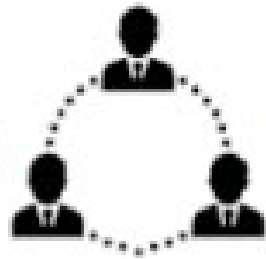
A segregation of duties matrix is a crucial tool for enhancing internal controls, ensuring the separation of responsibilities, and mitigating risks within an organization. Creating and maintaining a segregation of duties matrix requires a thorough understanding of an organization's operations, regulatory standards, and best practices.



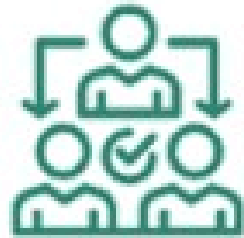
Separation Of Duties



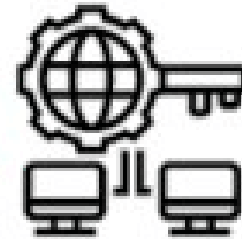
Identify the
business process



Determine
the roles



Assign the
Responsibilities



Implement
Access
Controls



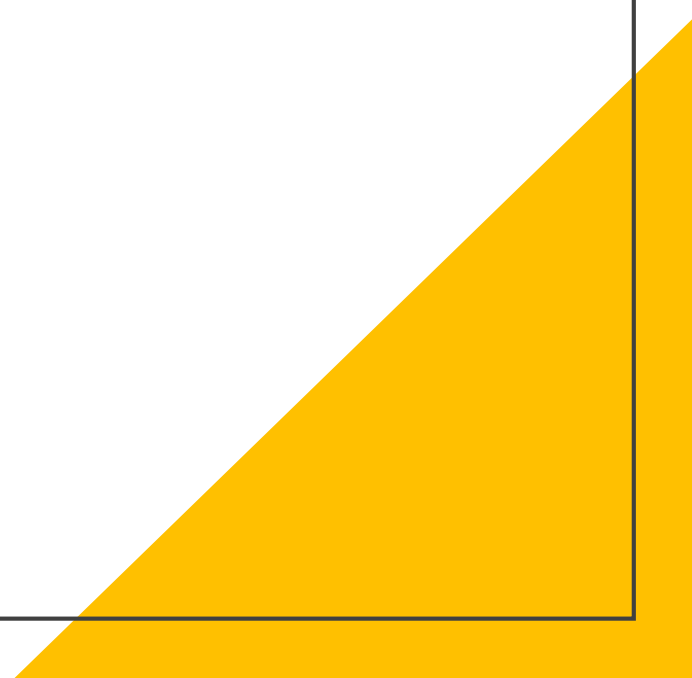
Monitor &
Review



Continuously
Improve



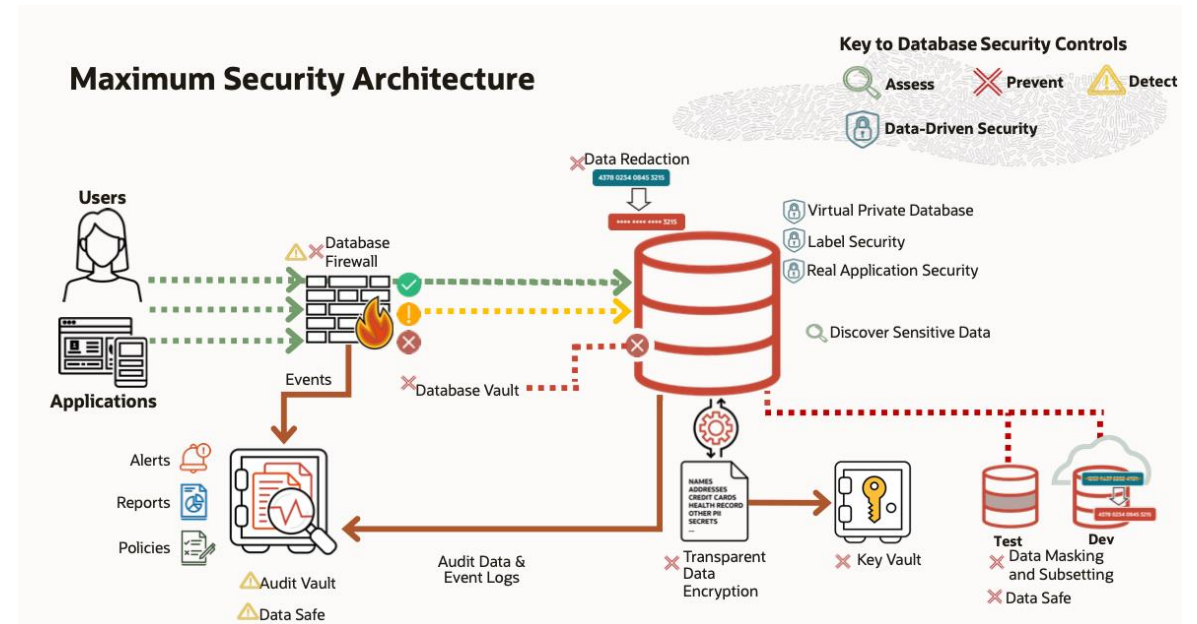
Sécurité Réseau

- SQLNET Encryption
 - TLS pour connexions
 - Restriction IP
 - Listener protégé
- 
- A yellow right-angled triangle is positioned in the bottom right corner of the slide, pointing towards the top-left.

- Gestion des users/roles/profiles
- TDE (Transparent Data Encryption)
- Network encryption (SQLNET)
- Auditing unifié
- Data Redaction / VPD / Label Security
- Séparation des rôles (DBA vs Security Admin)

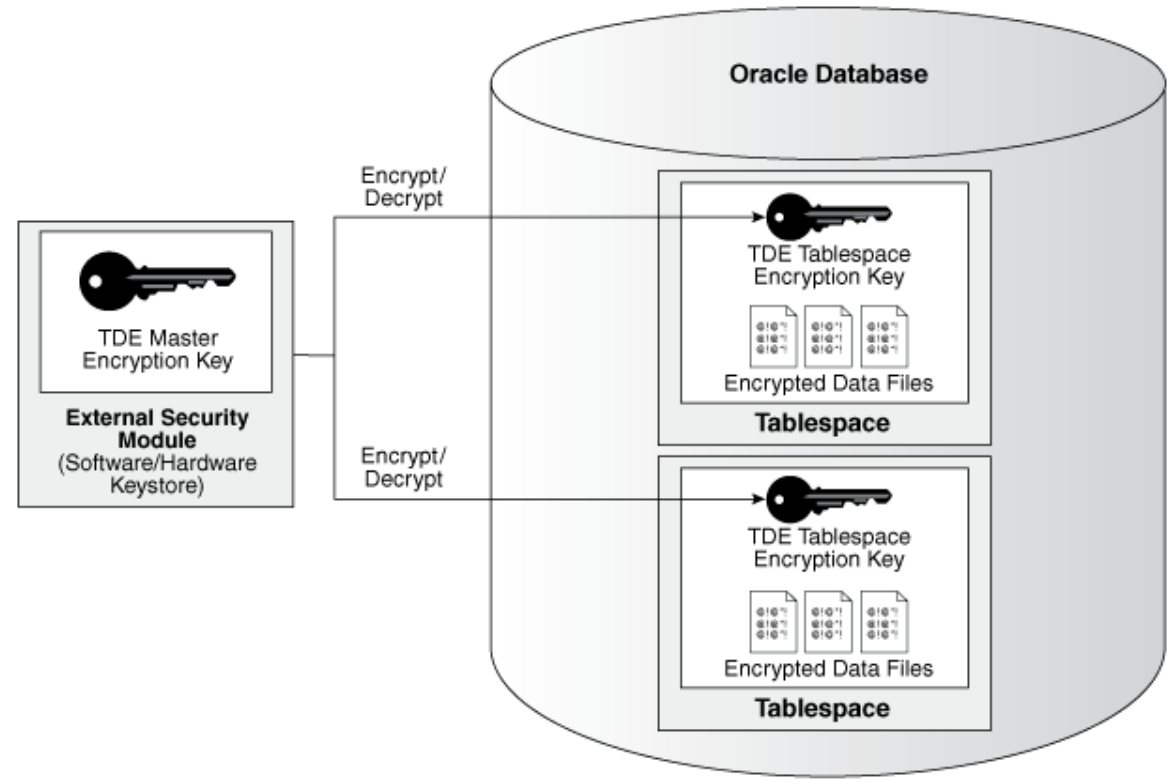


SECURITY ARCHITECTURE

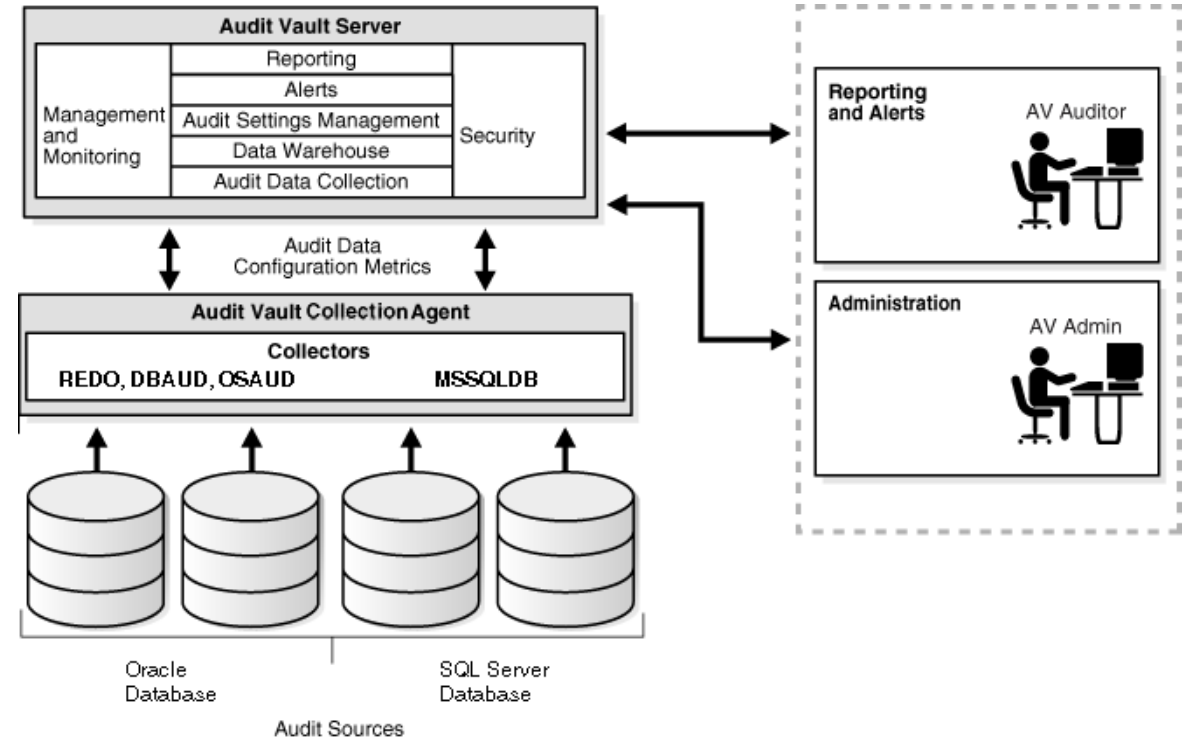




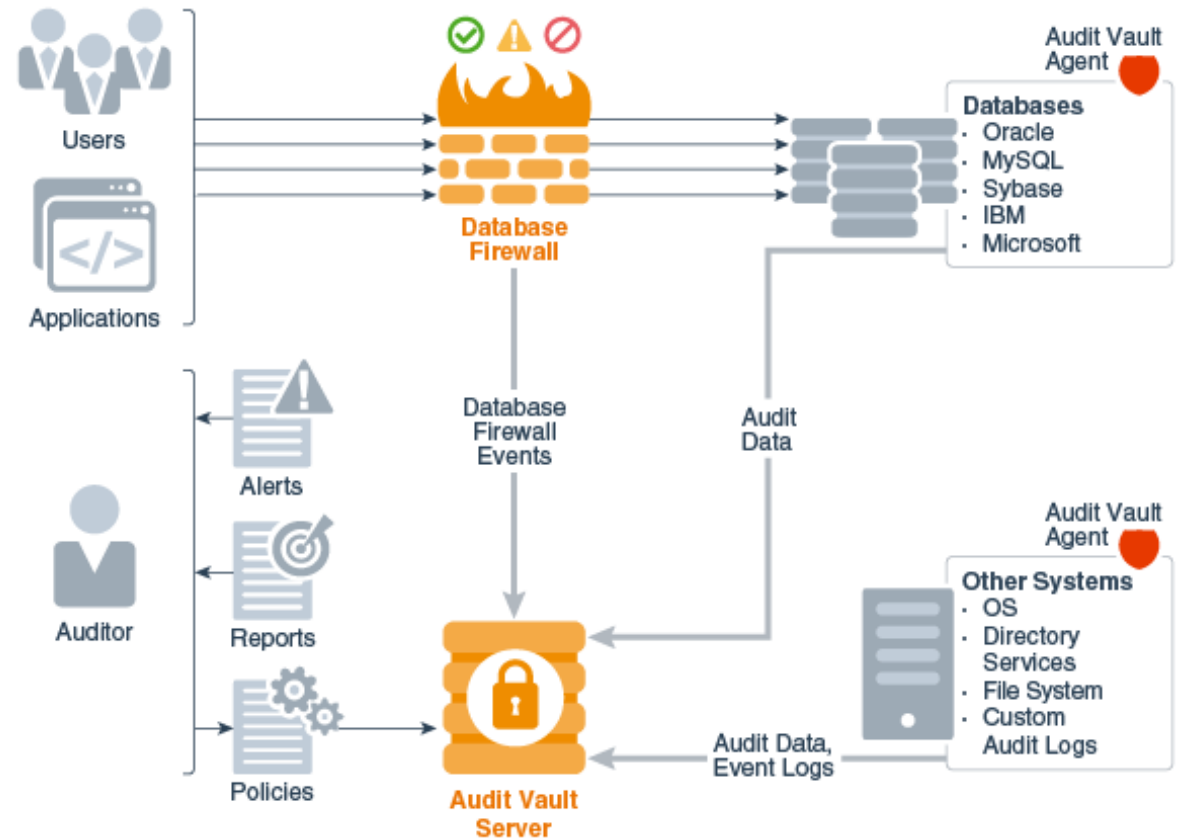
ENCRYPT/DECRYPT



AUDIT VAULT

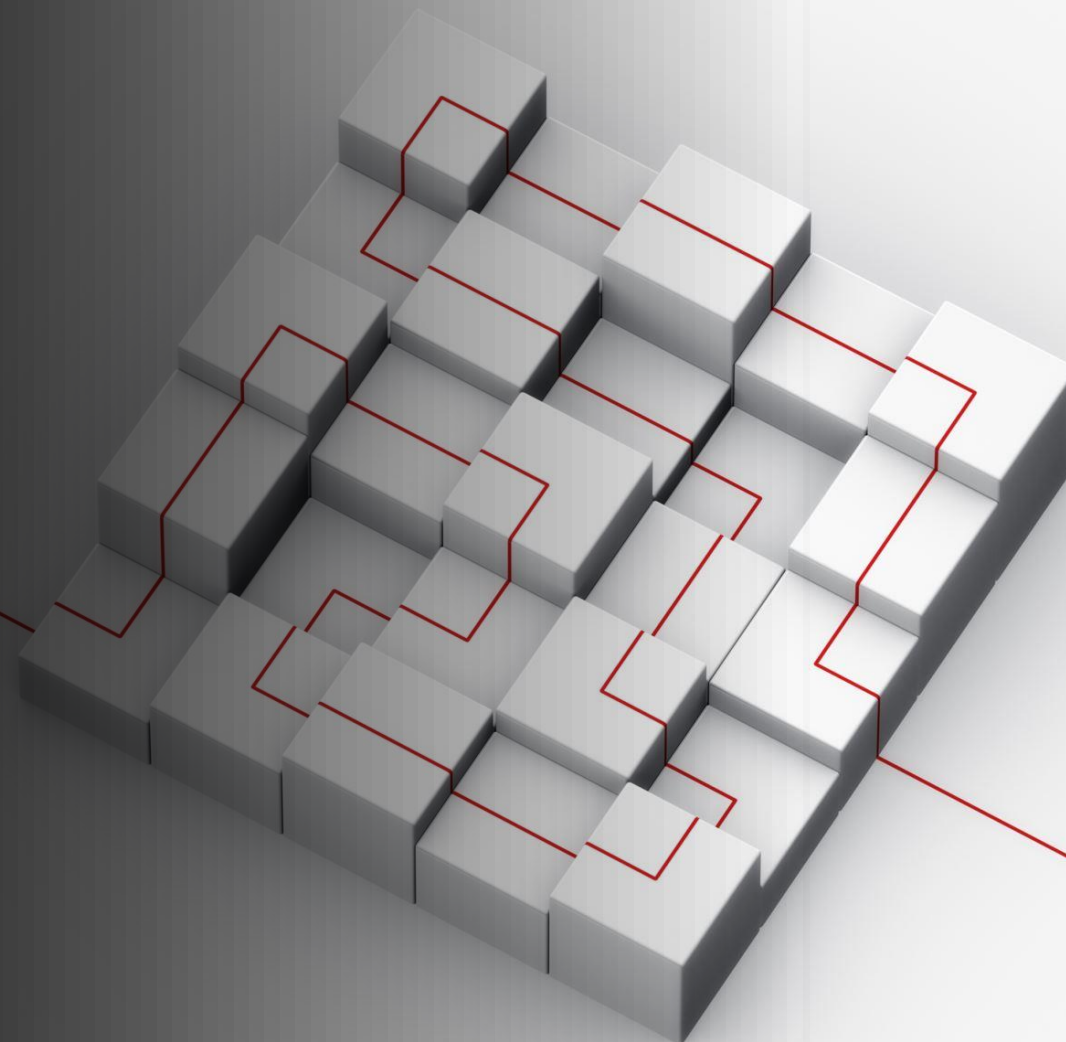


DATABASE FIREWALL





6 Haute Disponibilité & Continuité d'Activité



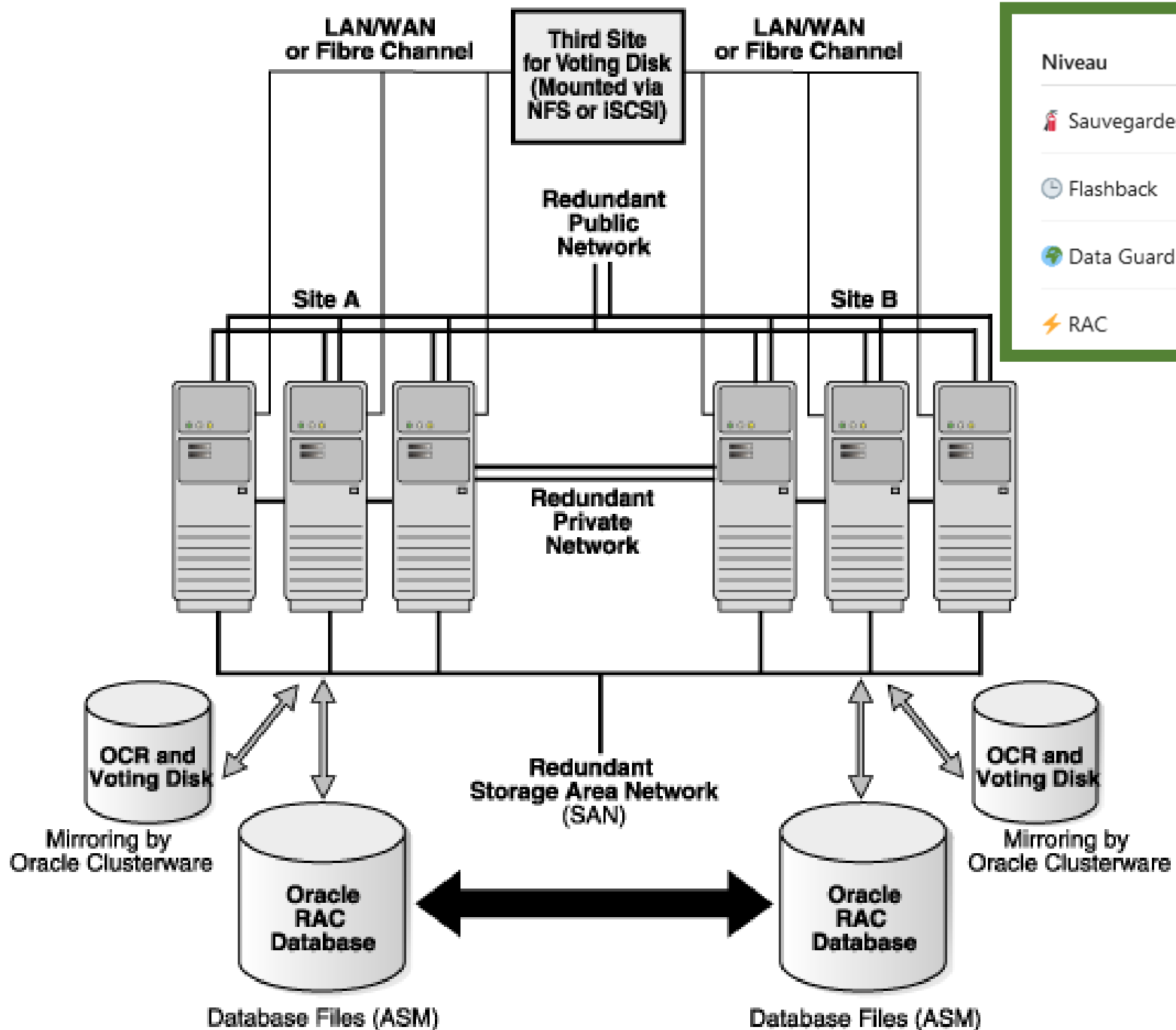
6 – HAUTE DISPONIBILITÉ & PLAN DE REPRISE ORACLE

- 1. Les 4 niveaux de protection Oracle
- 2. RMAN — La base de tout PRA
- 3. RESTORE & RECOVERY — Le vrai test du DBA
- 4. Flashback — Remonter le temps
- 5. Data Guard — Le clone vivant
- 6. RAC — Haute dispo locale
- 7. Combinaison typique d'entreprise

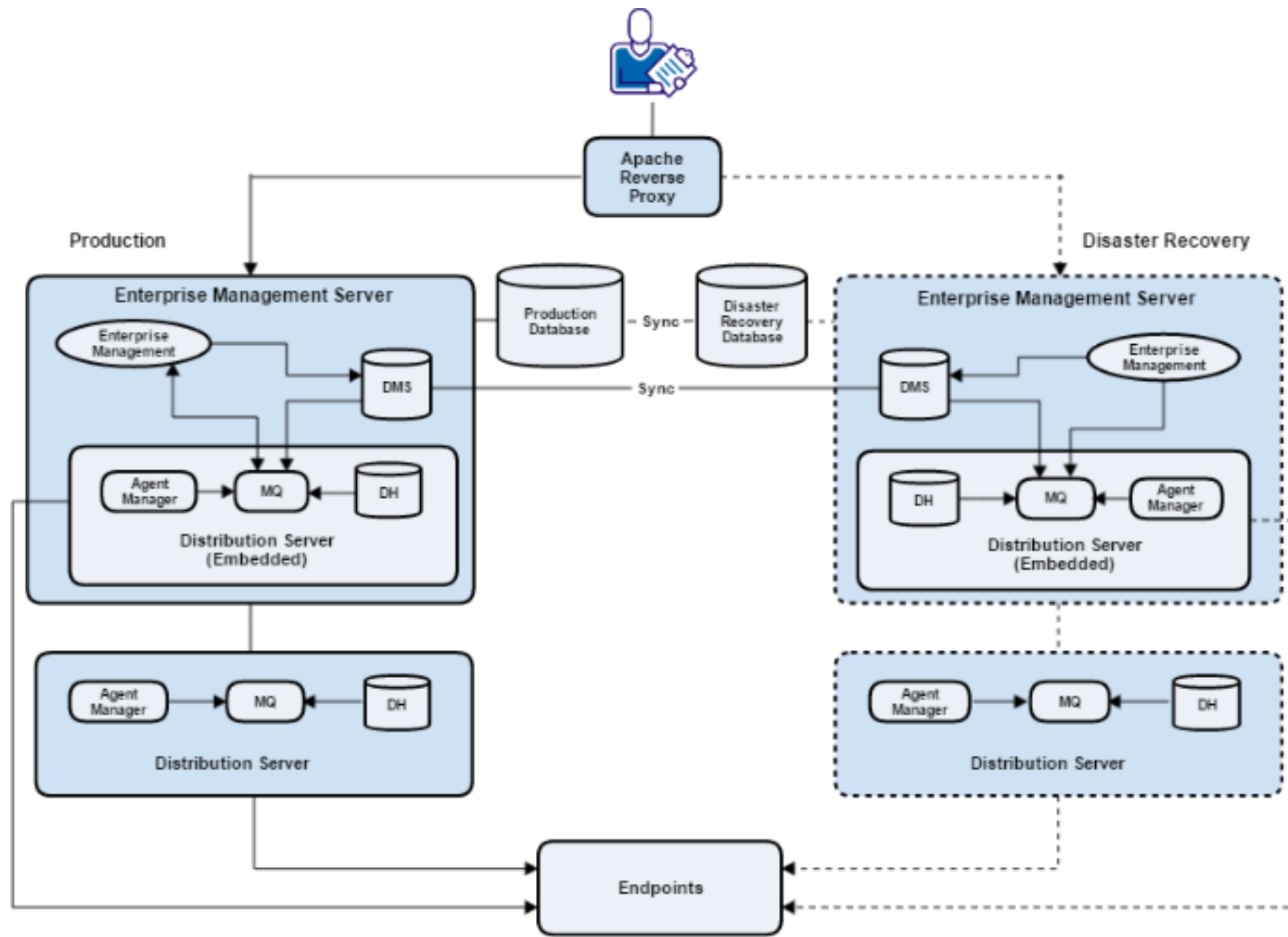


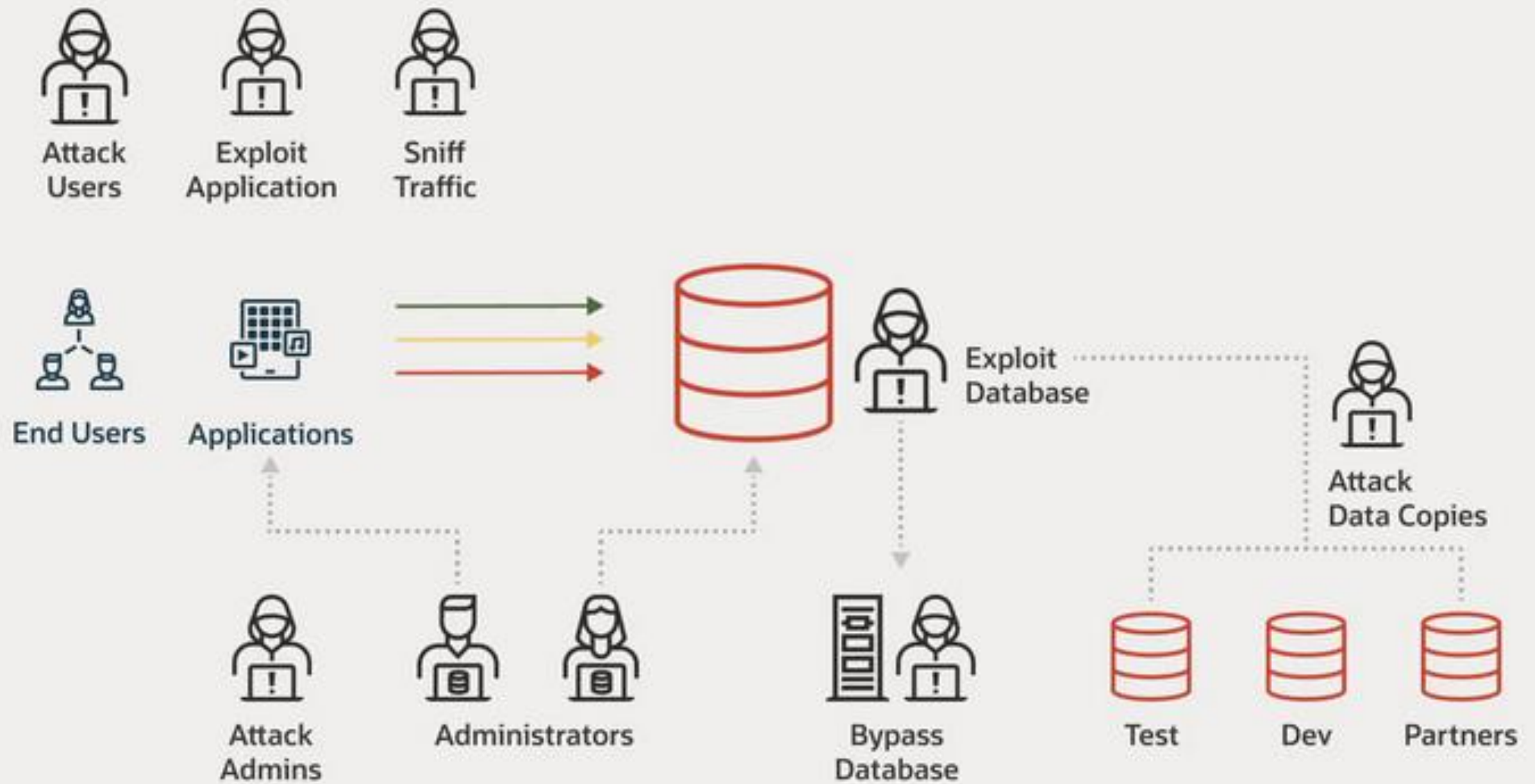
1. Les 4 niveaux de protection Oracle



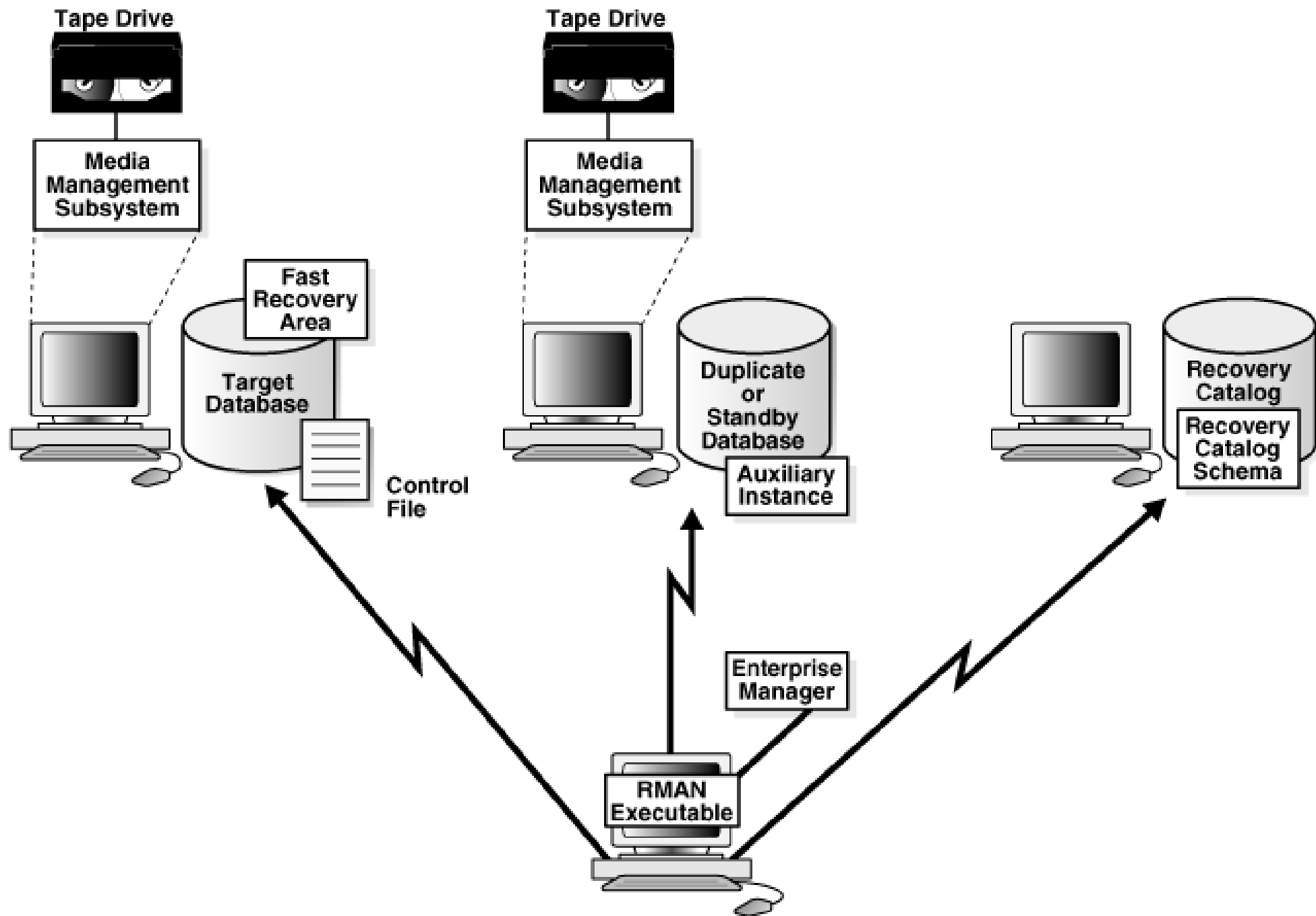


Niveau	Protège contre
Sauvegardes RMAN	Erreurs humaines / corruption
Flashback	Erreurs logiques
Data Guard	Perte serveur/site
RAC	Panne serveur locale





2. RMAN — La base de tout PRA

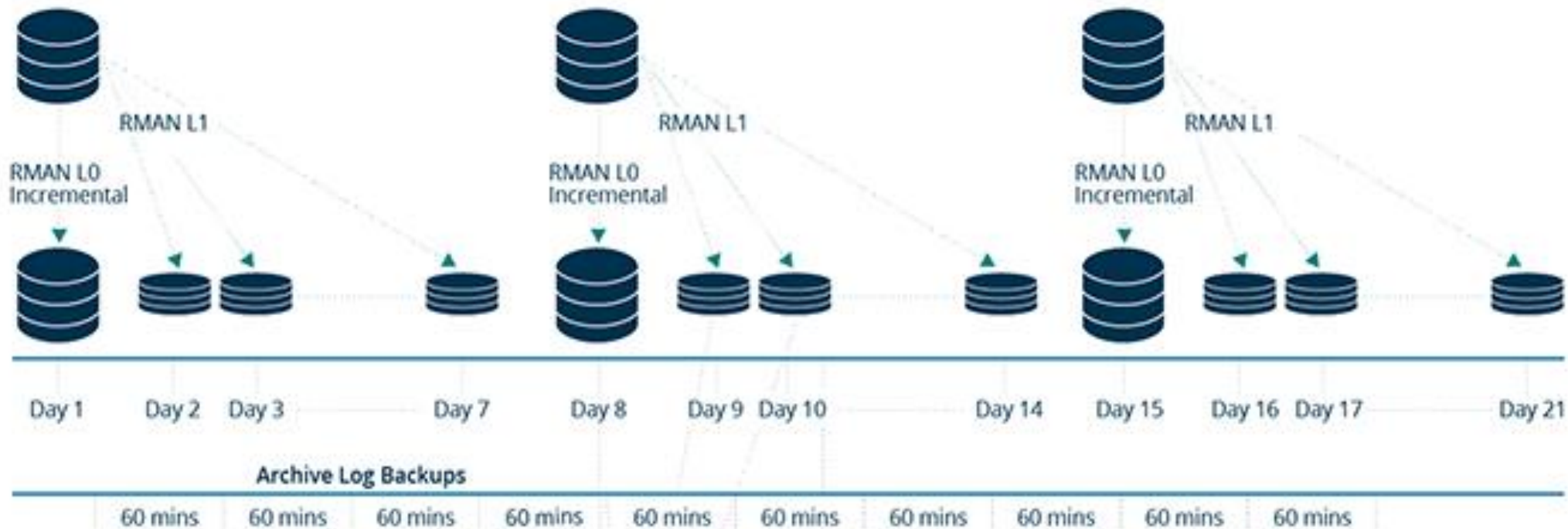


BACKUP

SOURCE ORACLE DATABASE

SOURCE ORACLE DATABASE

SOURCE ORACLE DATABASE



RESTORE



Type de sauvegardes

Type	Usage
Full	Base complète
Incremental	Changements
Archivelogs	Rejeu transactions

“Un backup non testé est un espoir, pas une stratégie. Et espérer ce n’est pas une tactique, c’est vouloir atterrir la jauge à 0”

- Full hebdo
- Incremental quotidien
- Archivelog toutes les heures

```
BACKUP DATABASE PLUS ARCHIVELOG;
```

3. RESTORE & RECOVERY — Le vrai test du DBA



Scénarios à maîtriser :

- Perte datafile
- Perte controlfile
- Perte redo log
- Corruption bloc

 Phrase d'expert :

“Je ne parle jamais de backup sans parler de restore.”

4. Flashback — Remonter le temps

The Backup : a TimeMachine

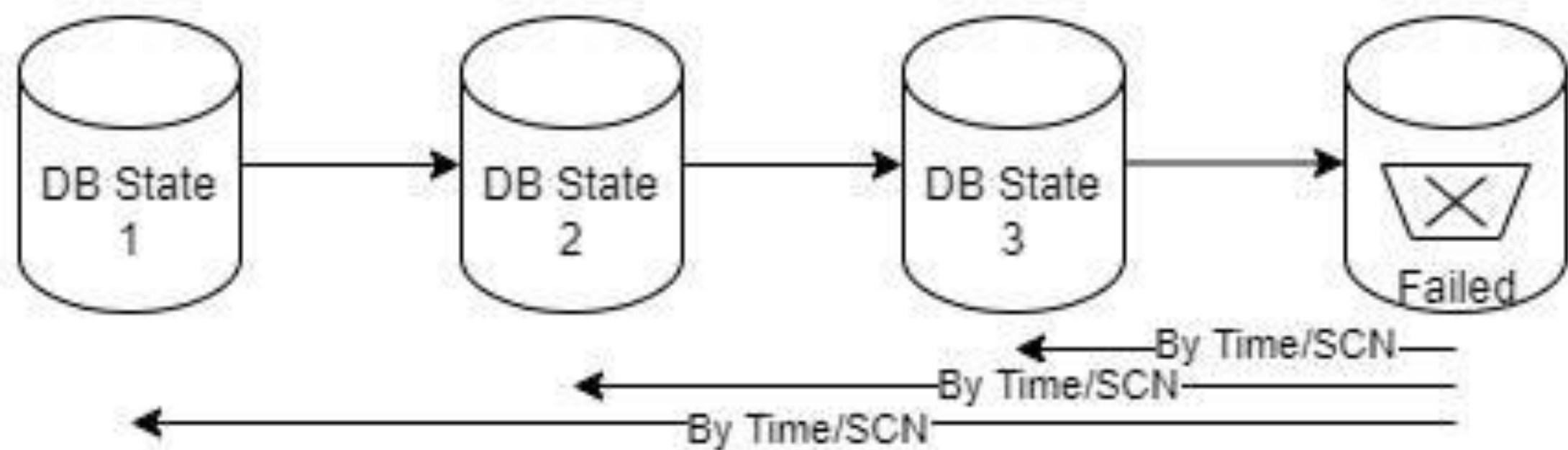
Fonction	Usage
Flashback Query	Voir ancienne version
Flashback Table	Restaurer table
Flashback Database	Retour base complète

Exemple :

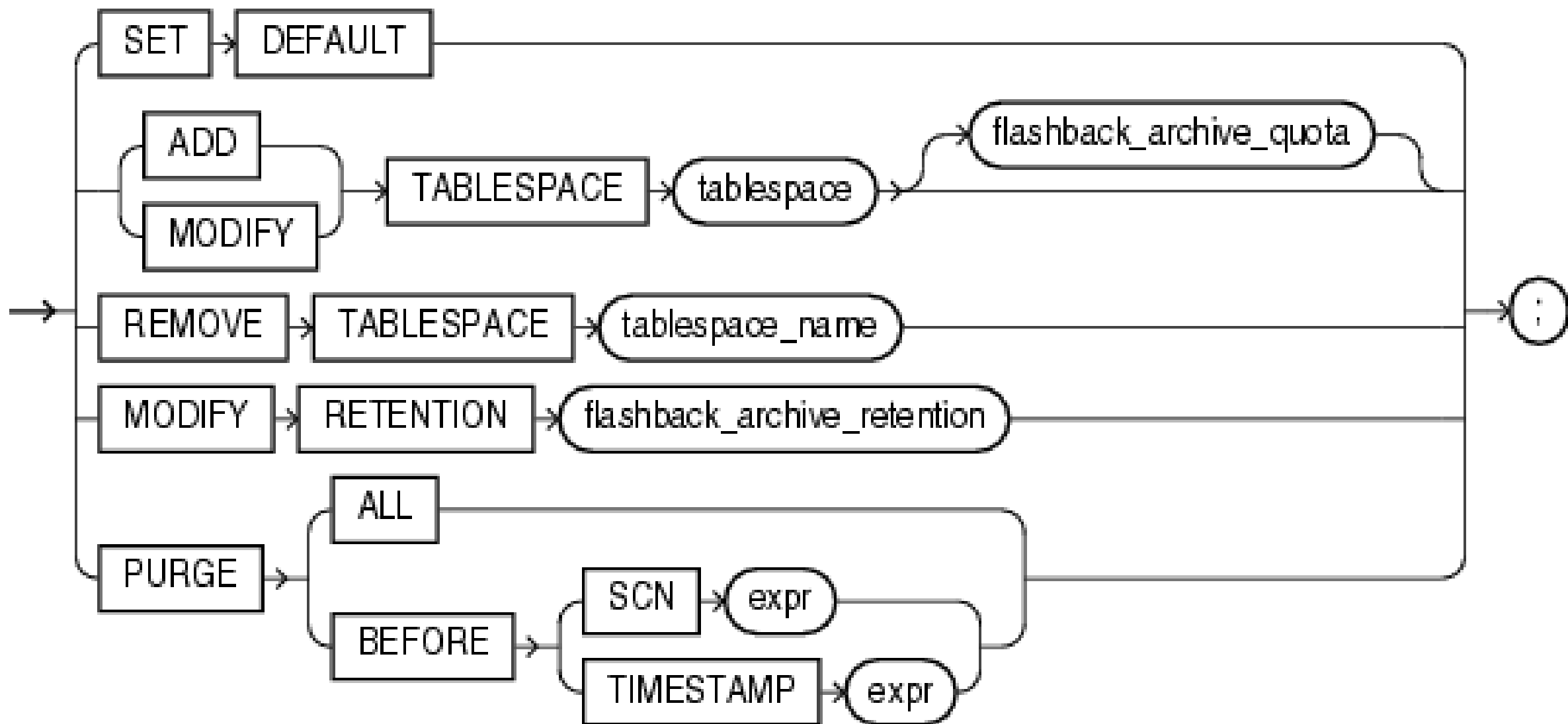
```
FLASHBACK TABLE orders TO TIMESTAMP (SYSTIMESTAMP - INTERVAL '1' HOUR);
```

 Cas réel :

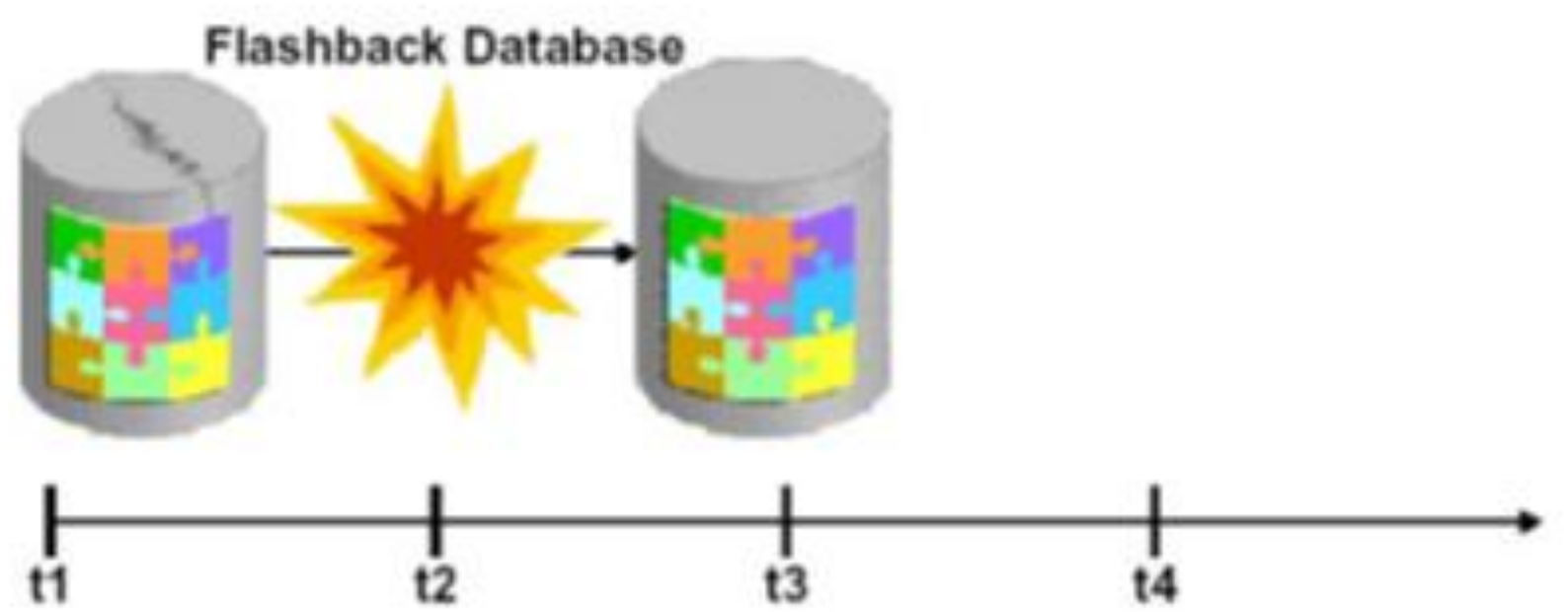
Un DELETE massif accidentel → rollback complet en 10 min



Database Flashback in Oracle 19c.



Benefits of Flashback Database



5. Data Guard — Le clone vivant

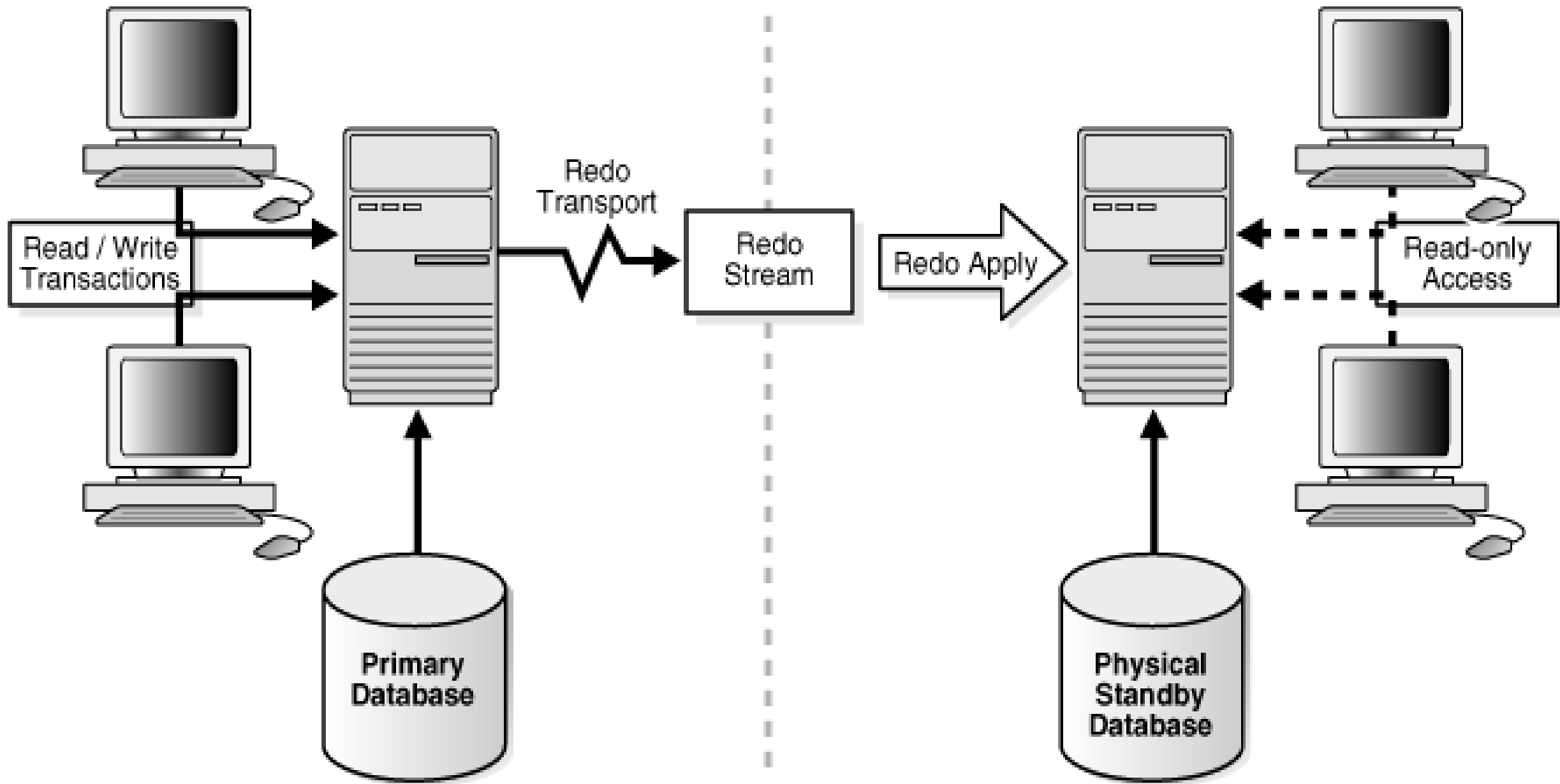
Date Guard : types disponibles

Type	Usage
Physical Standby	Copie exacte
Logical Standby	Réplication logique
Active Data Guard	Lecture sur standby

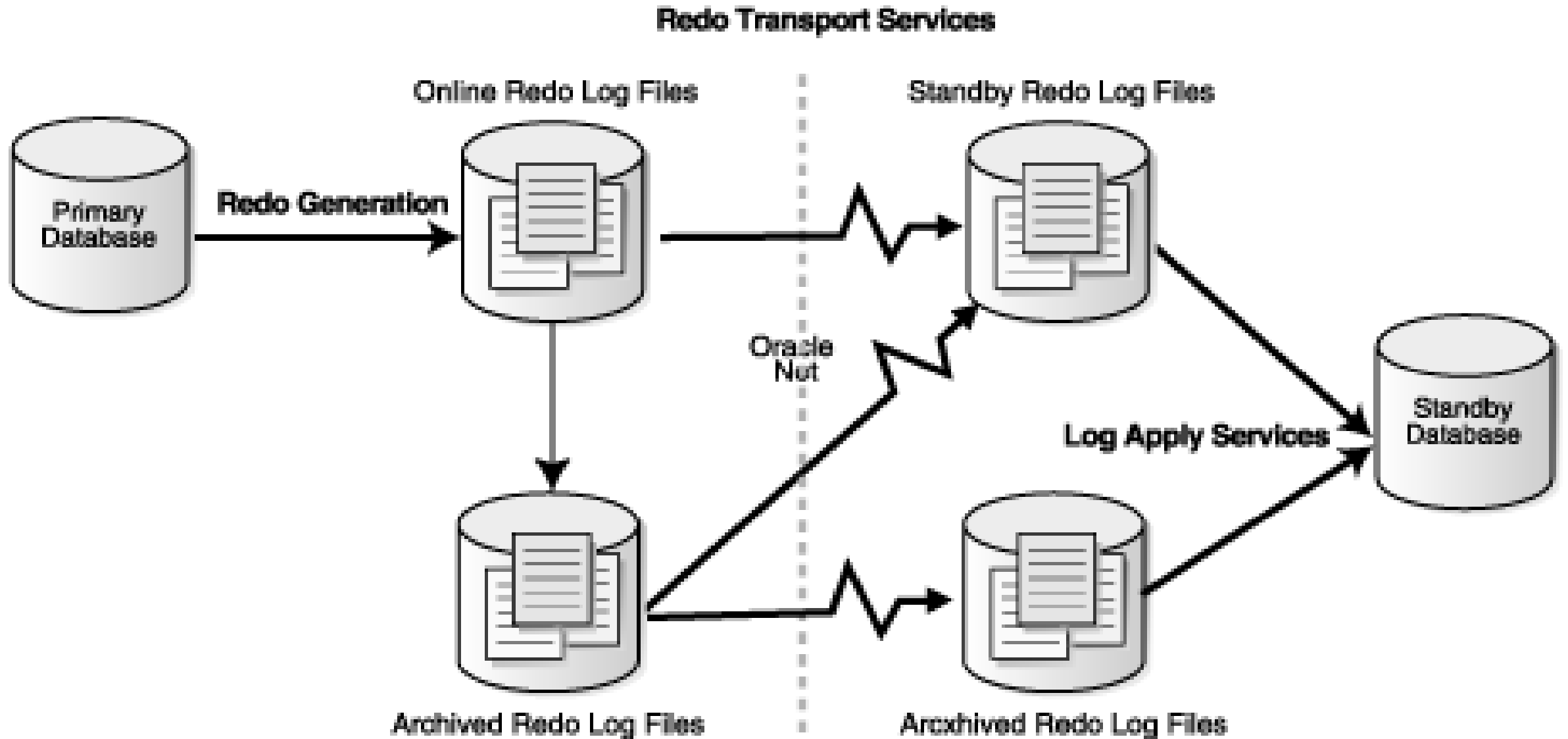
RPO / RTO

Mode	Perte possible
Max Protection	0 data loss
Max Performance	Latence réseau

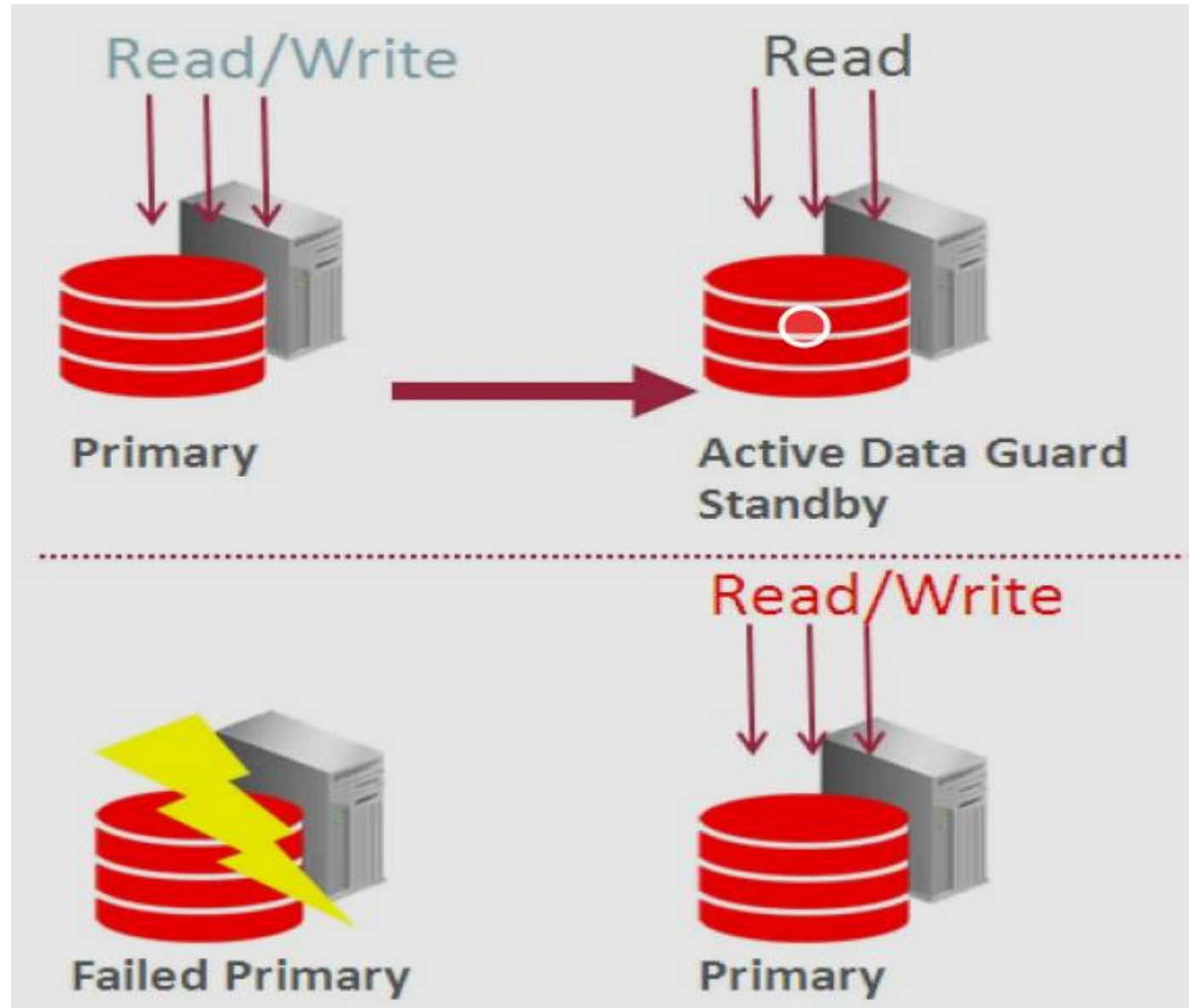
“Data Guard, c’est l’assurance vie de la base.”



RTS : FLOW DIAGRAM



READ/WRITE OPERATIONS



6. RAC — Haute dispo locale



Plusieurs serveurs = une seule base

Avantage

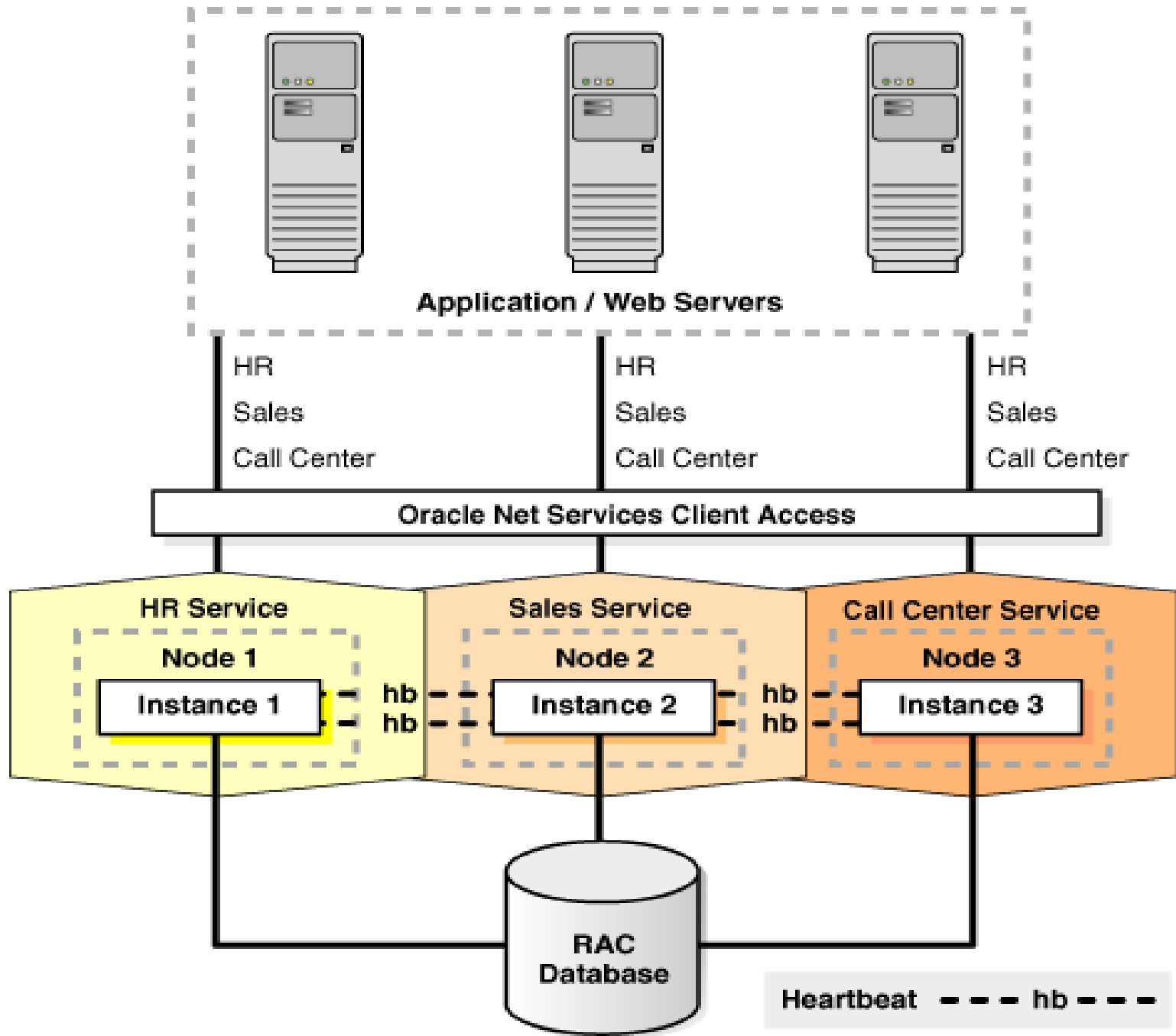
Failover automatique

Load balancing

Risque couvert

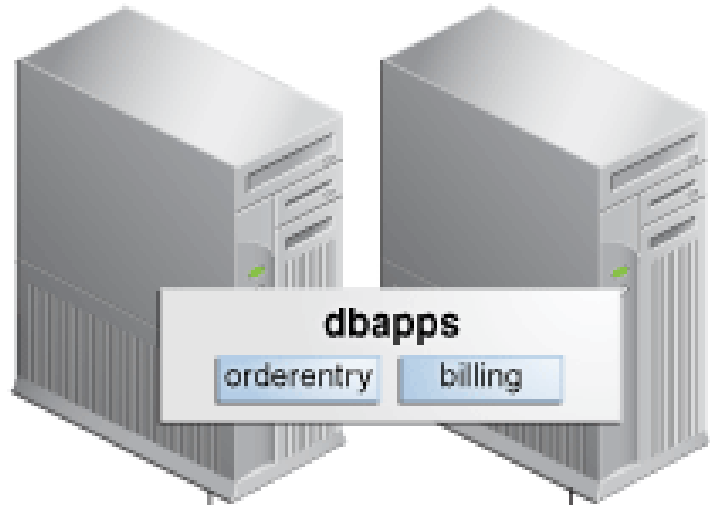
Panne serveur

Charge élevée



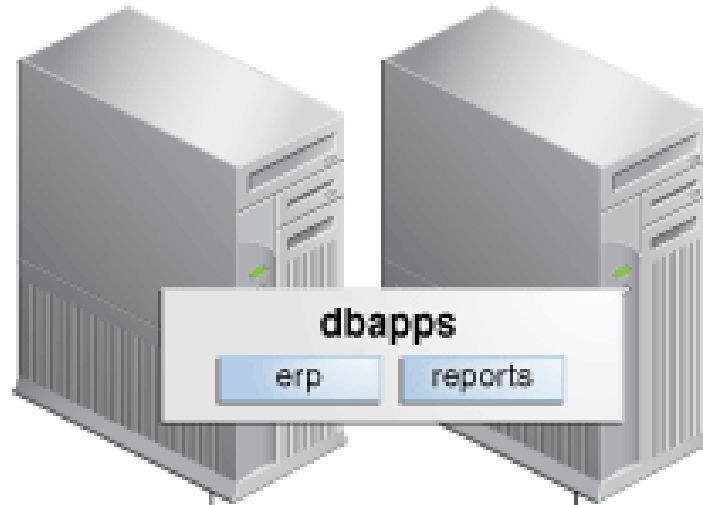
Sales Server Pool

Min = 2, Max = 3, Imp = 5



Backoffice Server Pool

Min = 2, Max = 2, Imp = 10



Free Server Pool

Min = 0, Max = -1, Imp = 0



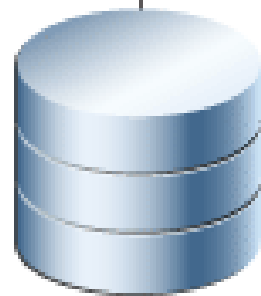
ASM Disk
Groups



ASM Disk
Groups



ASM Disk
Groups



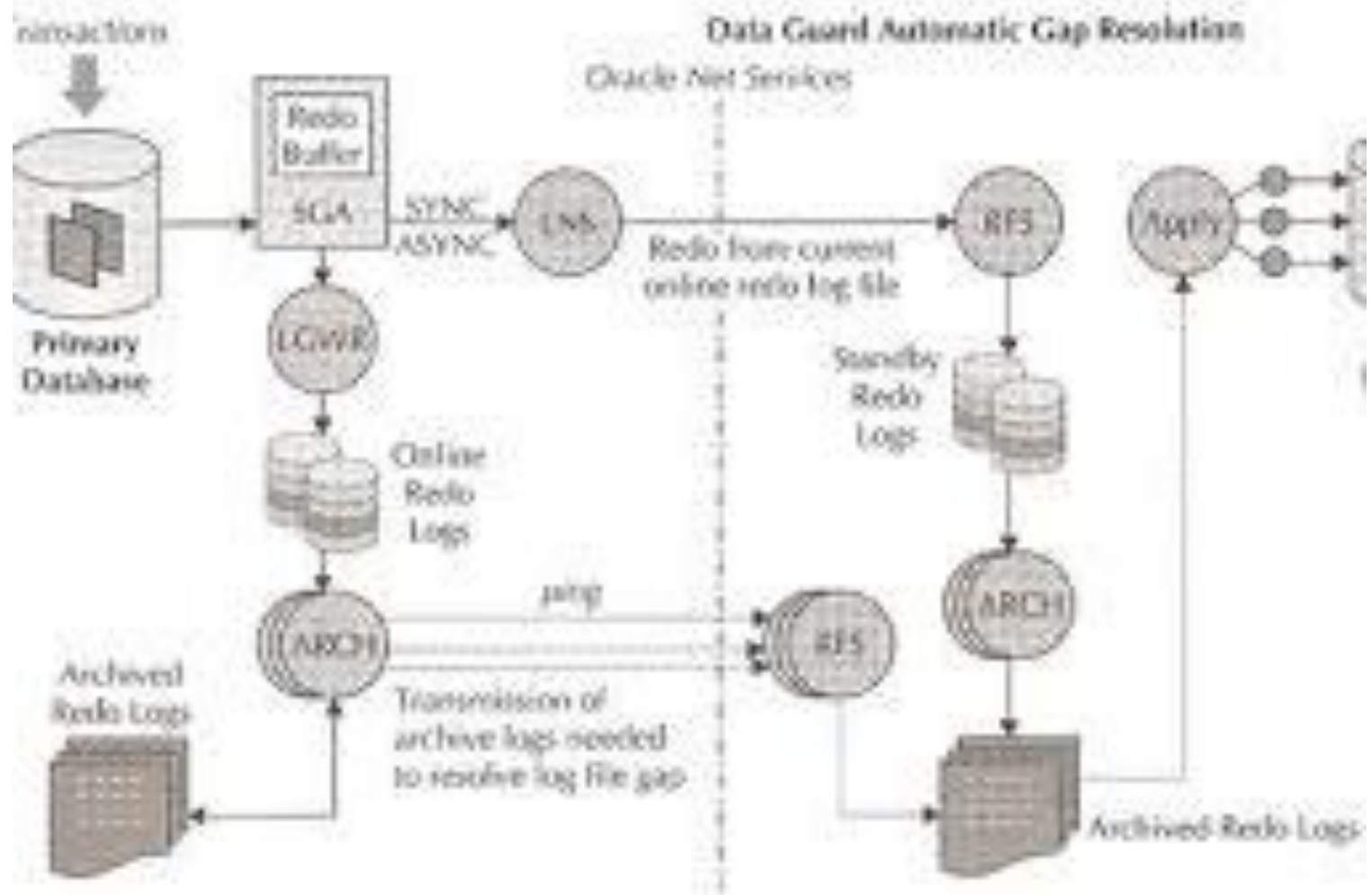
ASM Disk
Groups

- RMAN stratégie complète (Full / Incremental / Archivelog)
- Restore & Recovery scénarios réels
- Flashback technologies
- Data Guard (Physical / Logical / Active)
- Oracle RAC
- RPO / RTO : parler le langage métier



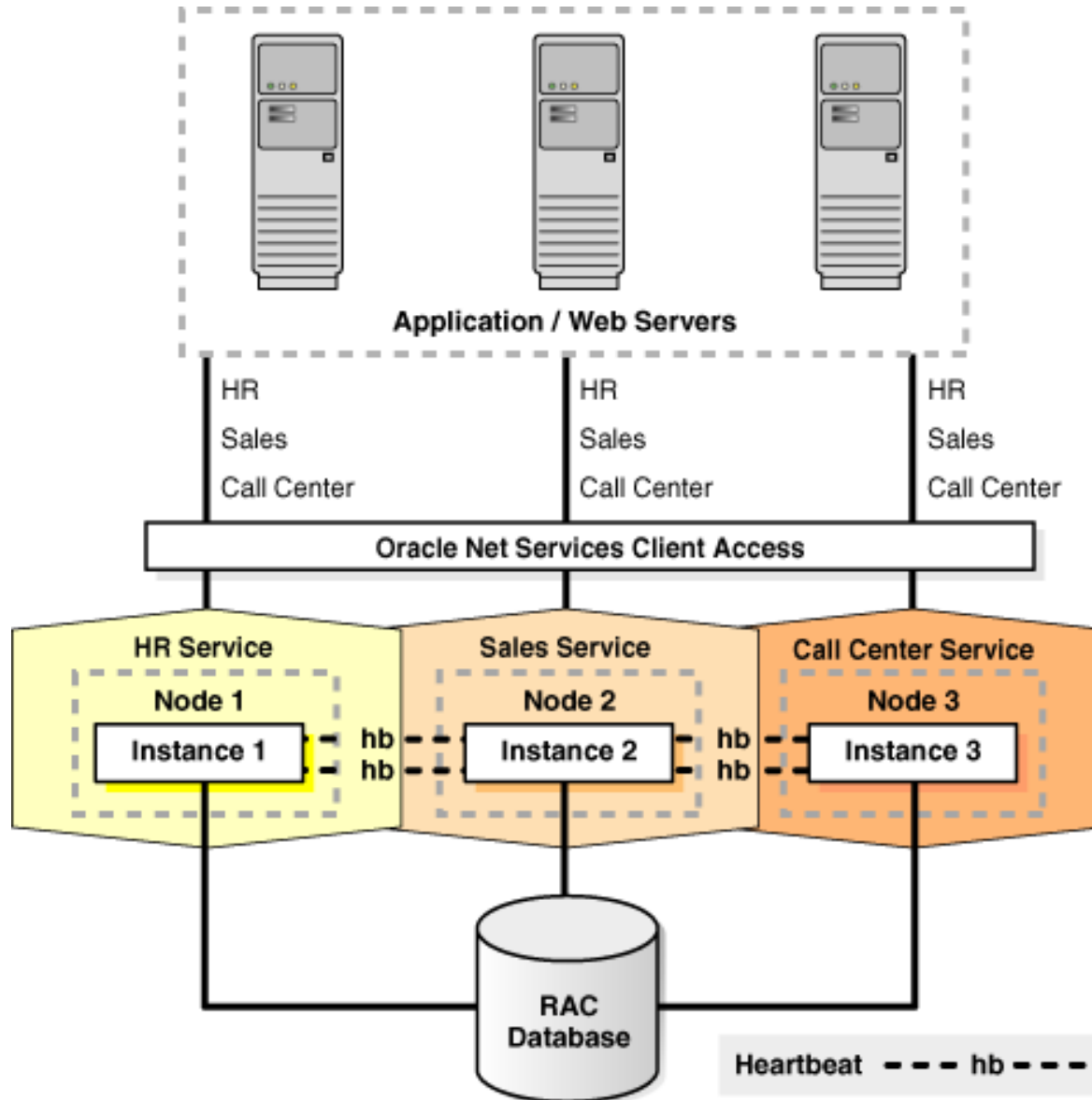


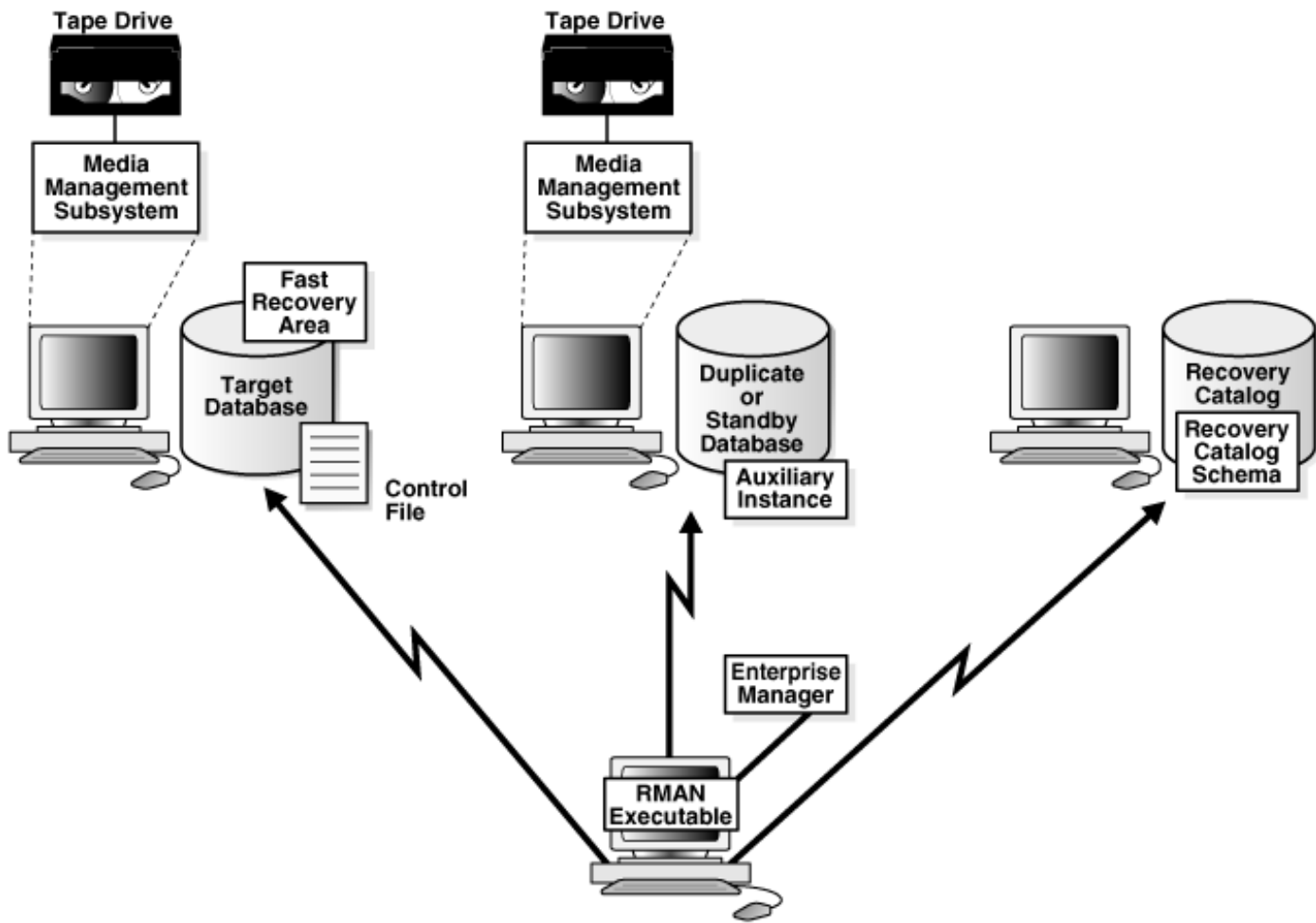
DATA GUARD



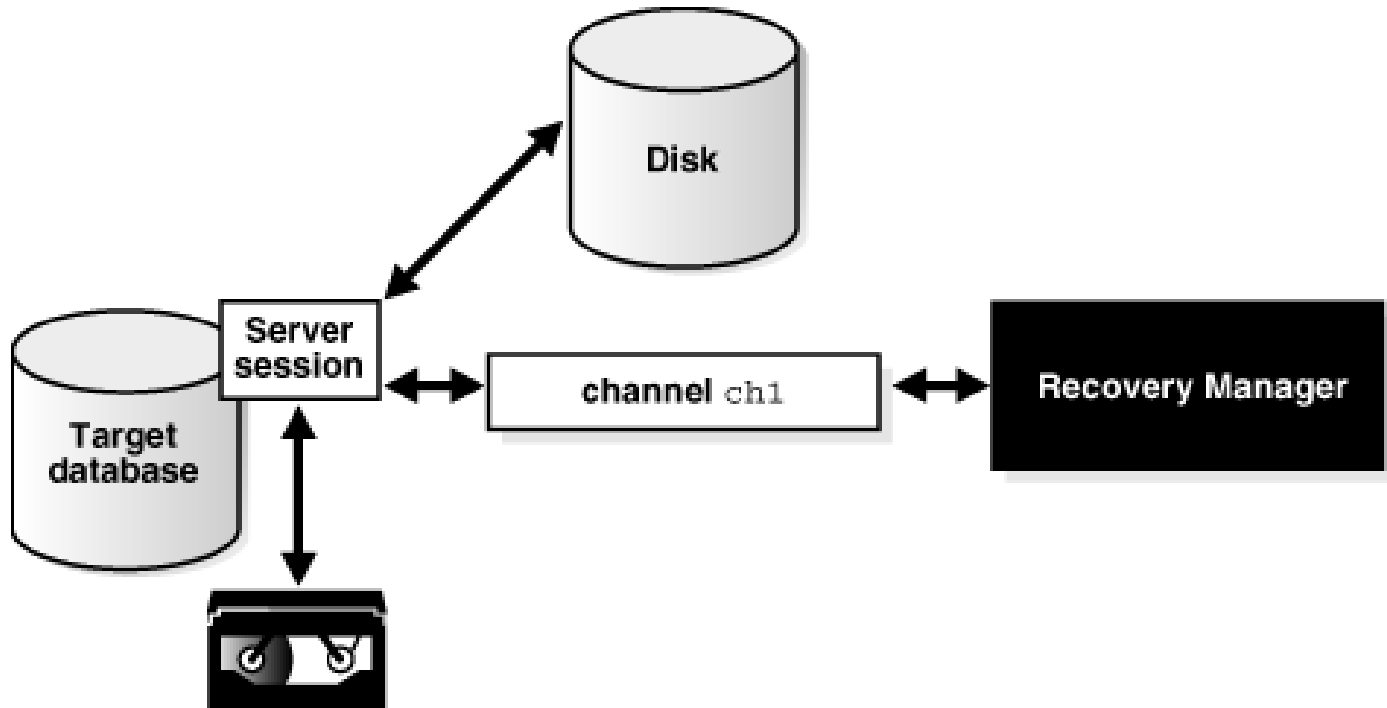
DATA GUARD

ORACLE NET SERVICE





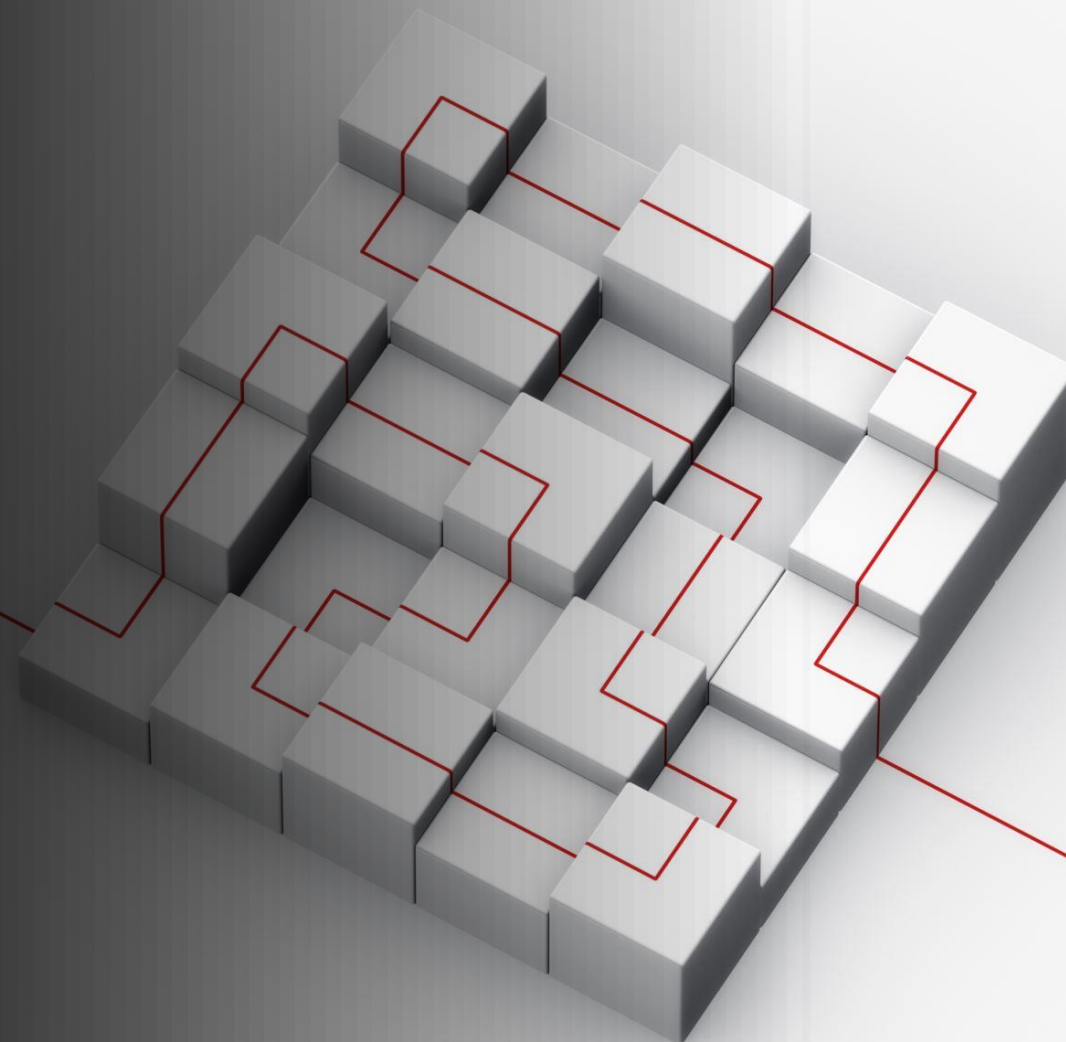
FAST RECOVERY





7

Supervision & Observabilité



7 – SUPERVISION & OBSERVABILITÉ ORACLE

- 1. Pourquoi la supervision est stratégique
- 2. OEM — Oracle Enterprise Manager
- 3. Alerting — Les seuils critiques
- 4. Les métriques clés à surveiller
- 5. Alert Log & Trace Files
- 6. Capacity Planning — Voir l'avenir
- 7. Scripts DBA de supervision rapide
- 8. Cas réel typique
- 9. Supervision moderne
 - **Prometheus / GRAFANA / CENTREON / ZABBIX**



1. Pourquoi la supervision est stratégique



Approche

Résultat

Réactive

Incidents utilisateurs

Proactive

Prévention

Prédictive

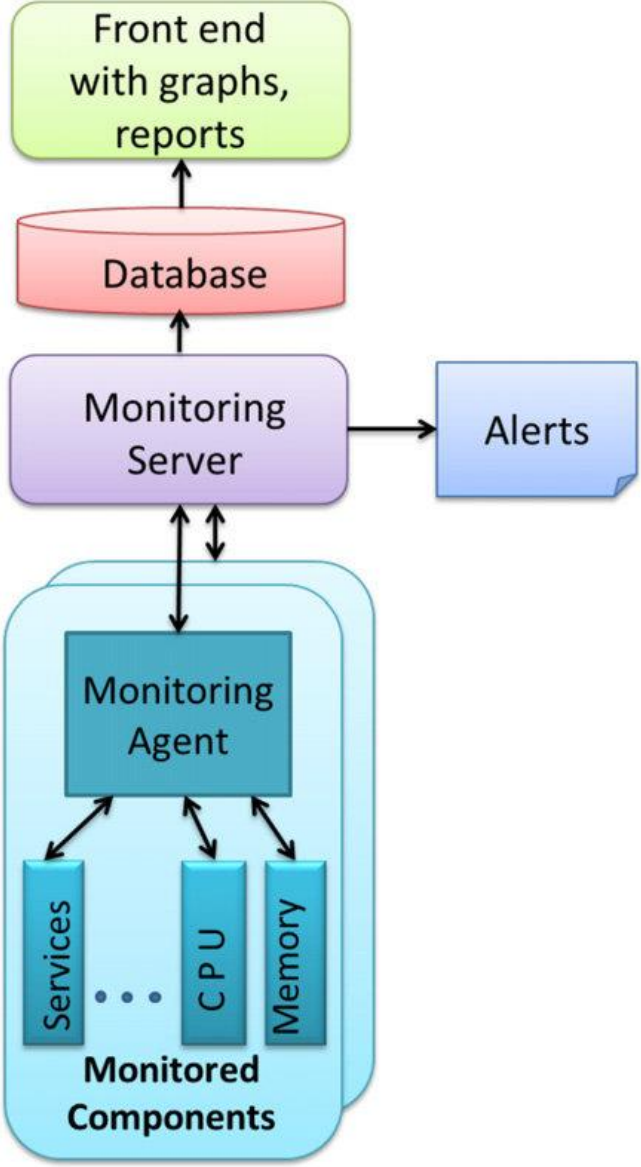
Anticipation capacité

“On ne peut pas gérer ce qu’on ne mesure pas.”

Enterprise Summary

Auto Refresh Off Page Refreshed Tue Apr 27 2021 10:22:39 GMT-0700 (Pacific Daylight Time)





- OEM Cloud Control
- Alert log / Trace files
- Scripts custom monitoring
- Capacity planning
- Détection proactive des incidents

“Le meilleur incident est celui qui n’arrive jamais.”



2. OEM — Oracle Enterprise Manager





OEM : Son rôle principal

Console centralisée de supervision Oracle

Fonction

Usage

Monitoring performance

Charge, waits

Alerting

Seuils

Jobs

Maintenance auto

Capacity planning

Croissance

“OEM me donne une vue hélicoptère sur toutes les bases.”

Performance Hub: Real Time - Last Hour

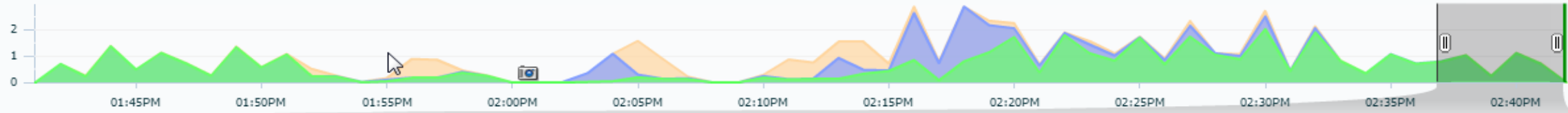
Select Time Period Hide Time Picker

Save

Page Refreshed 2:41:25 PM GMT-0800

Auto Refresh

1 Minute

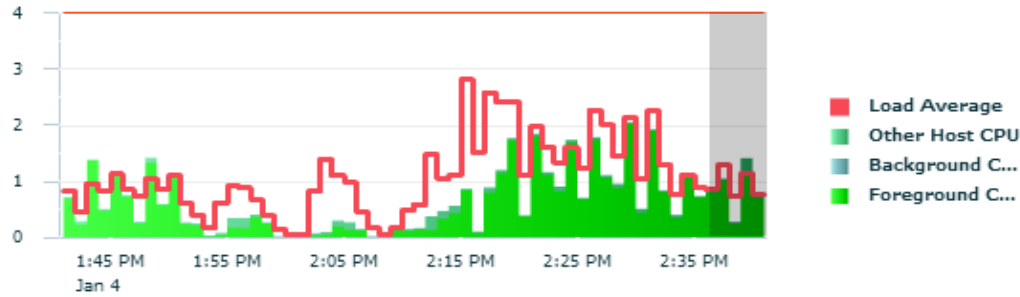


Summary

- Activity
- Workload
- Monitored SQL
- ADDM
- Current ADDM Findings

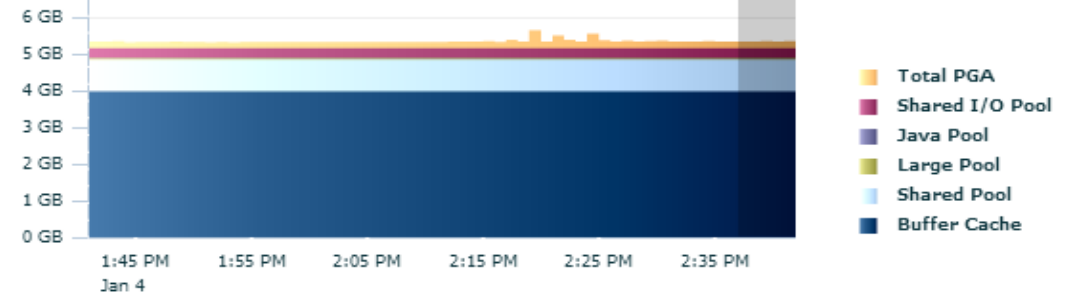
Host: Runnable Processes

Show Load Average



Memory: Host Total 17.3GB

Show Host Memory

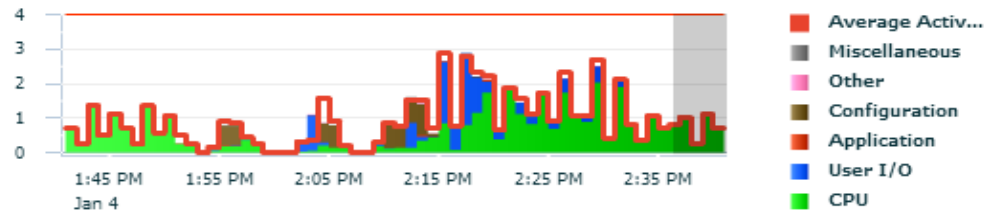


Active Sessions

Activity

Services

Foreground Only Foreground + Background



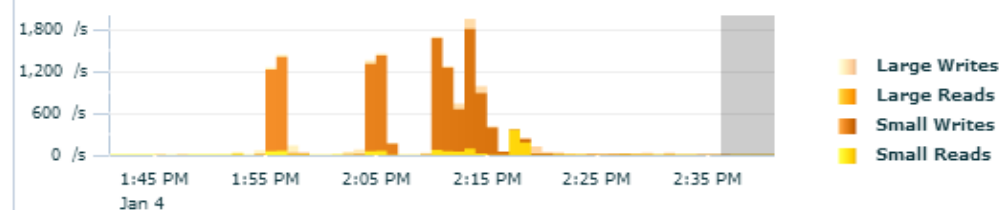
I/O

Requests

Throughput

Latency

I/O Type I/O Function I/O Consumer Group



Tablespace Details

<input type="checkbox"/>	Tablespace Name	allocatedbytes	Total Allocated Bytes(MB)	Used Bytes(MB)	Free Bytes(MB)	Percentage of Used Bytes(%)	Percentage of Free Bytes(%)	Allocated Blocks	Free Blocks	Health	Configure Alarms
<input type="checkbox"/>	USERS	<div style="width: 100%; height: 10px; background-color: #90EE90;"></div>	32,767.98	1.56	32,766.42	0	100	640	440	●	
<input type="checkbox"/>	TEMP	<div style="width: 100%; height: 10px; background-color: #90EE90;"></div>	32,767.98	0	32,767.98	0	100	19,200	19,200	●	
<input type="checkbox"/>	UNDOTBS1	<div style="width: 100%; height: 10px; background-color: #90EE90;"></div>	32,767.98	20.81	32,747.17	0.06	99.94	98,560	95,896	●	
<input type="checkbox"/>	SYSTEM	<div style="width: 100%; height: 10px; background-color: #90EE90;"></div>	32,767.98	792.25	31,975.73	2.42	97.58	102,400	992	●	
<input type="checkbox"/>	SYSAUX	<div style="width: 100%; height: 10px; background-color: #90EE90;"></div>	32,767.98	841	31,926.98	2.57	97.43	115,200	7,552	●	

Compare Reports

Tablespace Status

<input type="checkbox"/>	Tablespace Name	Status	Data Files	Reads /Min.(reads/min)	Writes /Min.(write/min)	Read Time	Write Time	Health	Configure Alarms
<input type="checkbox"/>	UNDOTBS1	ONLINE	1	0	0	3,072	5,862	●	
<input type="checkbox"/>	USERS	ONLINE	1	0	0	357	114	●	
<input type="checkbox"/>	SYSTEM	ONLINE	1	0	0	35,680	12,029	●	
<input type="checkbox"/>	SYSAUX	ONLINE	1	1	0	1,008,406	63,394	●	
<input type="checkbox"/>	TEMP	ONLINE	1	0	0	35,680	12,029	●	

Compare Reports

[Overview of Setup](#)[Roles](#)[Administrators](#)**Notification Methods**[E-mail](#)[Customization](#)[Patching Setup](#)[Blackouts](#)[Registration](#)[Passwords](#)[Management Pack](#)[Access](#)[Monitoring](#)[Templates](#)[Corrective Action](#)[Library](#)[Management](#)[Plug-ins](#)[Management](#)[Connectors](#)[Data Exchange](#)[Client System](#)[Analyzer in Grid](#)[Control](#)[Manage Privilege](#)[Delegation](#)[Settings](#)

Notification Methods

Notification Methods allow you to globally define different mechanisms for sending notifications. These include e-mail, SNMP traps and running custom scripts. Once defined, Notification Methods are used by Notification Rules to send notifications to administrators for alerts, policy violations or job status changes. Each administrator has Notification Rules defined as a preference.

Mail Server

Enterprise Manager requires the following information to send e-mail notifications by means of Notification Rules. When specifying multiple SMTP servers, separate each server by a comma or space. Revert Apply Test Mail Servers

Outgoing Mail (SMTP) Server	<input type="text" value="stajv15.us.oracle.com:2025"/>
	<small>Use the format SERVER:PORT (Example: SMTP1:587). Port 25 is used if no port is specified for the server. (Example: SMTP1, MyServer:587).</small>
User Name	<input type="text"/>
	<small>Specify user name if your SMTP server requires authentication.</small>
Password	<input type="text"/>
	<small>Specify the authentication password. The name and password will be used for all SMTP servers.</small>
Confirm Password	<input type="text"/>
Identify Sender As	<input type="text" value="ft3 Notifications"/>
Sender's E-mail Address	<input type="text" value="diya.roy@oracle.com"/>
Use Secure Connection	<input checked="" type="radio"/> No <input type="radio"/> TLS, if available <input type="radio"/> SSL

Scripts and SNMP Traps

Before Enterprise Manager can send notifications by means of OS commands, PL/SQL procedures, SNMP traps, or Java Callbacks, they must first be defined as Notification Methods. Administrators can then use these methods in Notification Rules.

Add Go

View Edit Delete			
Select	Name	Type	Support Repeat Notifications
<input type="radio"/>	Microsoft Operations Manager Connector	Java Callback	No
<input checked="" type="radio"/>	dy_ft3_os	OS Command	Yes

TIP Remember to create Notification Rules in order to send notifications by means of these methods.

Repeat Notifications

Repeat notifications allow you to be notified repeatedly about the same metric or availability alert. Once enabled, you will still need to choose the Repeat Notifications option in each Notification Rule that will use it. If you disable repeat notifications on this page, all repeat notifications will stop.

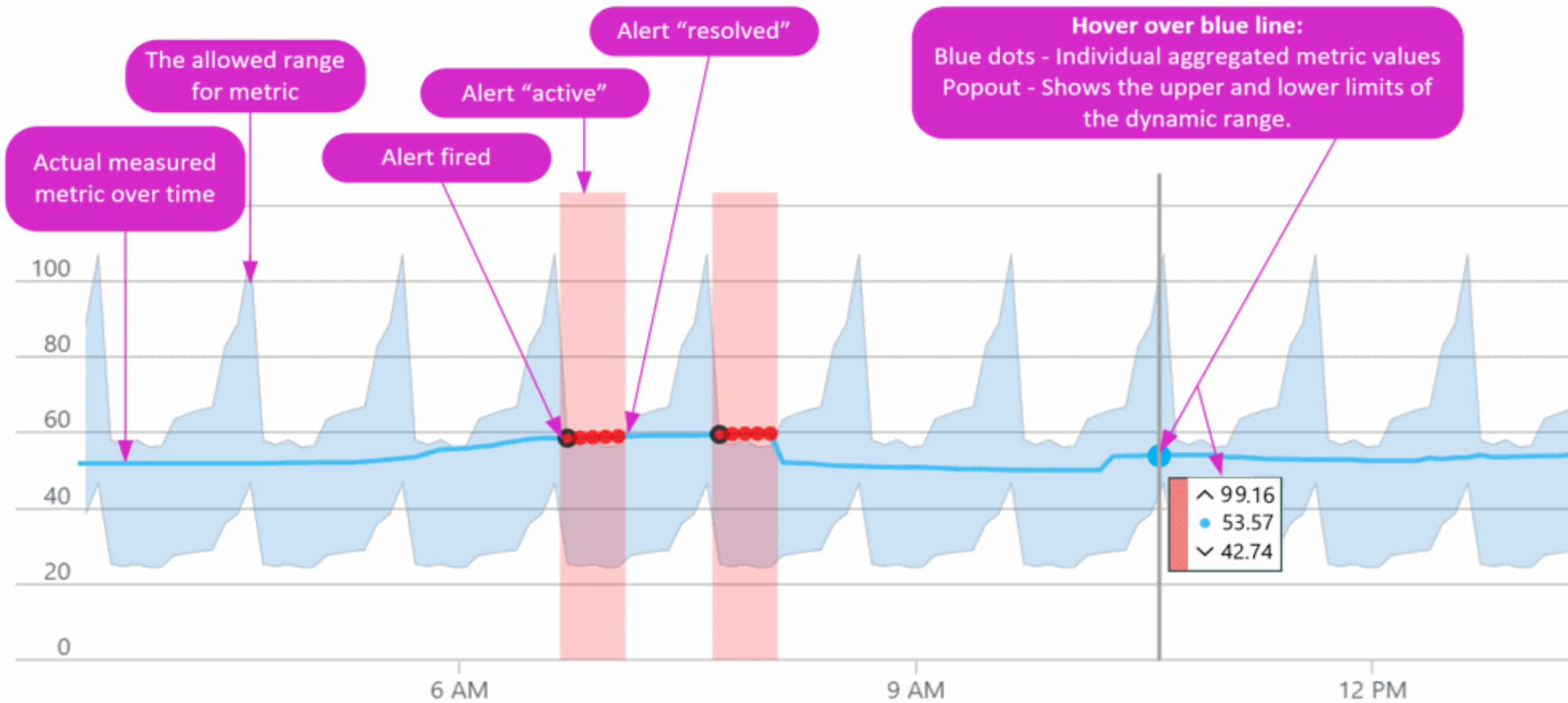
 Send Repeat NotificationsRepeat Frequency (minutes) Maximum Repeat Notifications [Home](#) | [Targets](#) | [Deployments](#) | [Alerts](#) | [Compliance](#) | [Jobs](#) | [Reports](#) | [Setup](#) | [Preferences](#) | [Help](#) | [Logout](#)

3. Alerting — Les seuils critiques

Élément	Seuil recommandé
Tablespace usage	85%
FRA usage	80%
CPU DB	> 75% soutenu
Sessions bloquées	> 0 critique

Sans alerting → incident

Avec alerting → action préventive



Alerts

Category All

Go







Critical  3

Warning  2

 Previous

1-10 of 15

Next 5 

Severity 	Category	Name	Message	Alert Triggered
	Tablespaces Full (dictionary managed)	Tablespace Free Space (MB) (dictionary managed)	Tablespace [MOZART_FULL_DICTIONARY] has [0.19 mbytes] free	May 5, 2005 9:05:38 AM
	Tablespaces Full (dictionary managed)	Tablespace Free Space (MB) (dictionary managed)	Tablespace [MOZART_G] has [0.62 mbytes] free	May 5, 2005 9:05:38 AM
	Tablespaces Full (dictionary managed)	Tablespace Free Space (MB) (dictionary managed)	Tablespace [MOZART_LOCAL_CONVERTED] has [1.12 mbytes] free	May 5, 2005 9:05:38 AM
	Tablespaces Full (dictionary managed)	Tablespace Space Used (%) (dictionary managed)	Tablespace [MOZART_G] is [87.6 percent] full	May 5, 2005 9:05:38 AM
	Tablespaces Full (dictionary managed)	Tablespace Space Used (%) (dictionary managed)	Tablespace [MOZART_FULL_DICTIONARY] is [96.2 percent] full	May 5, 2005 9:05:38 AM

4. Les métriques clés à surveiller



Domaine

Indicateur

Performance

DB Time, Top Waits

Mémoire

SGA hit ratio

I/O

Read latency

Espace

Tablespaces

Activité

Sessions actives

5. Alert Log & Trace Files



Le alert.log est le journal vital d'Oracle.

On y trouve :

- ORA- errors
- Corruption
- Problèmes redo
- Erreurs background process

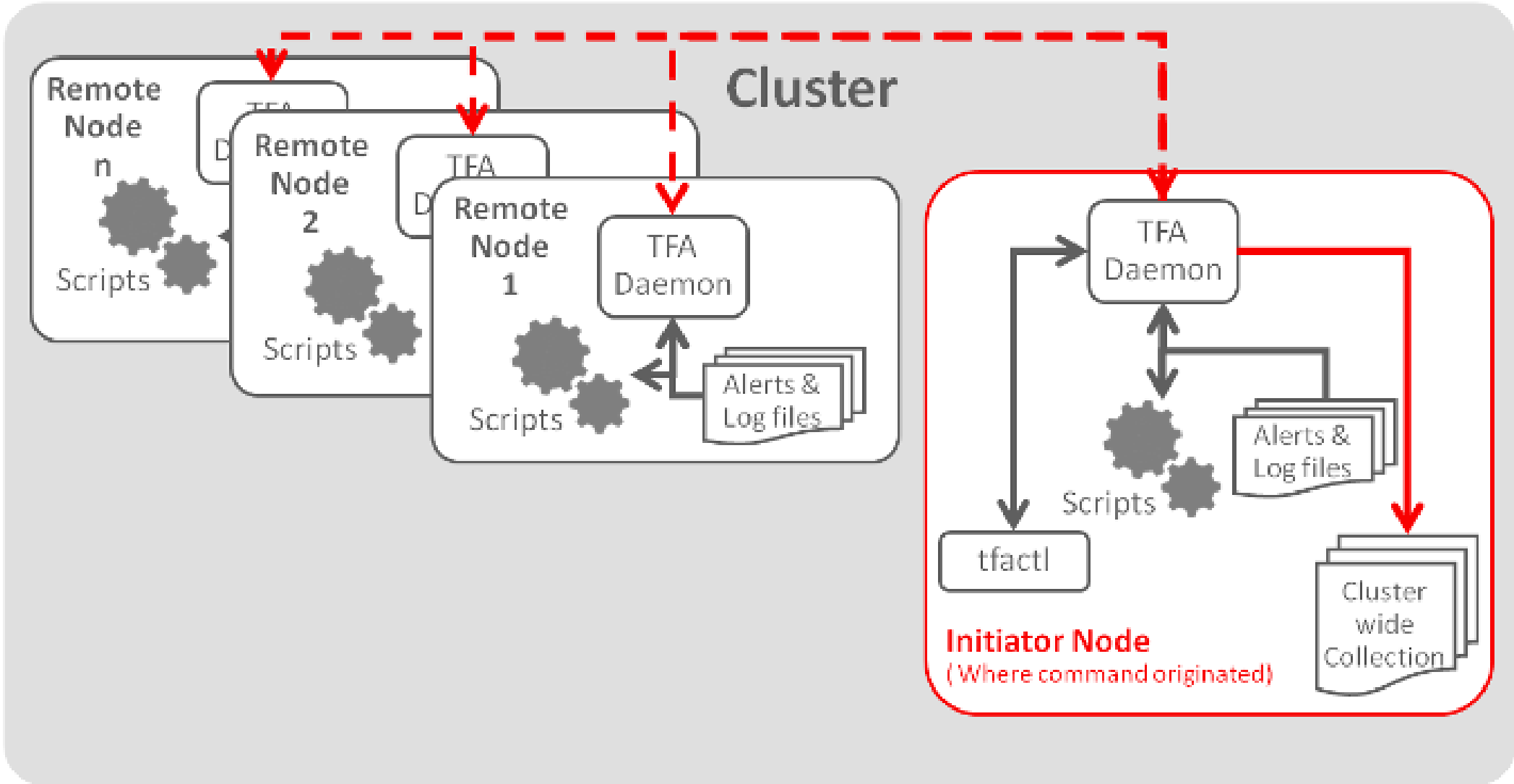
***“Je lis l’alert log
tous les jours,
même quand
tout va bien.”***

OAL : Sample reports

Oracle Alert Log

ID	Text	Timestamp
0	Shutting down instance (immediate)	2014-12-10 07:04
1	Stopping background process SMCO	2014-12-10 07:04
2	Stopping background process FBDA	2014-12-10 07:04
3	Shutting down instance: further logons disabled	2014-12-10 07:04
4	Stopping background process CJQ0	2014-12-10 07:04
5	Stopping background process MMNL	2014-12-10 07:04
6	Stopping background process MMON	2014-12-10 07:04
7	License high water mark = 116	2014-12-10 07:04
8	alter database close normal	2014-12-10 07:04
9	SMON: disabling tx recovery	2014-12-10 07:04
10	Stopping Emon pool	2014-12-10 07:04
11	Stopping Emon pool	2014-12-10 07:04
12	SMON: disabling cache recovery	2014-12-10 07:04
13	Shutting down archive processes	2014-12-10 07:04

TFA PROCESS & TFA DEAMON



6. Capacity Planning — Voir l'avenir



Ressource

Question clé

Stockage

Quand sera-t-il plein ?

CPU

Charge croissante ?

I/O

Saturation proche ?

Objectif :

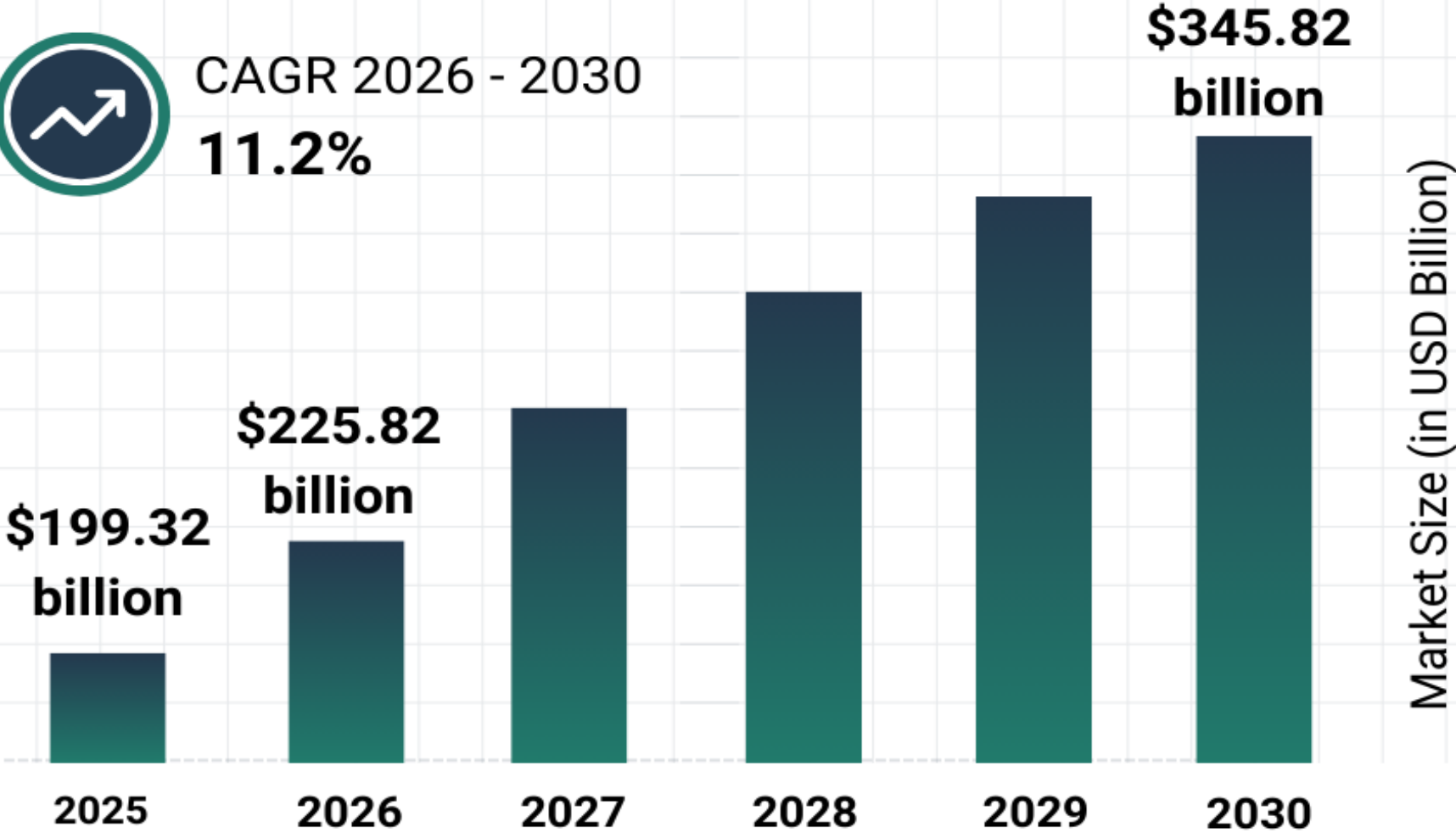
 prévoir avant saturation

 éviter achat en urgence

Data Storage Market Report 2026



CAGR 2026 - 2030
11.2%



● Healthy (114) ✓
 ● Warning (1) ⚠️
 ● Critical (0) ❗

Sev.	Interface	Capacity	Network Boundary	Connectivity Type	Provider	Traffic (P95) ▾	Utilization (P95) ▾	Runout	Trend
⚠️	irb.3 (938) INT::edge03::ae1.3 ●●●●●●●●●●●●●●●●	1000 Mb/s	Internal	Datacenter Interco...		In ▲ 845.25 Mb/s Out 1.54 Mb/s	▲ 84.53% 0.15%	In N/A Out N/A	
✓	et-0/0/48 (557) INT::qfx.iad2::et-0/0/50 ●●●●●●●●●●●●●●●●	40 Gb/s	Internal	Datacenter Interco...		In 13.49 Gb/s Out 10.42 Gb/s	33.72% 26.05%	In Over a year Out N/A	↗ 46 Mb/s / Wk ↘ 25 Mb/s / Wk
✓	ae10 (531) INT::qfx.iad2::ae10 ●●●●●●●●●●●●●●●●	80 Gb/s	Internal	Datacenter Interco...		In 26.74 Gb/s Out 20.79 Gb/s	33.43% 25.99%	In Over a year Out N/A	↗ 54 Mb/s / Wk ↘ 35 Mb/s / Wk
✓	et-1/0/48 (559) INT::qfx.iad2::et-1/0/50 ●●●●●●●●●●●●●●●●	40 Gb/s	Internal	Datacenter Interco...		In 13.33 Gb/s Out 10.41 Gb/s	33.33% 26.01%	In Over a year Out N/A	↗ 3 Mb/s / Wk ↘ 9 Mb/s / Wk
✓	et-0/0/50 (683) INT::qfx.iad1::et-0/0/48 ●●●●●●●●●●●●●●●●	40 Gb/s	Internal	Datacenter Interco...		In 10.28 Gb/s Out 13.24 Gb/s	25.71% 33.10%	In Over a year Out Over a year	↗ 33 Mb/s / Wk ↘ 31 Mb/s / Wk

7. Scripts DBA de supervision rapide



LES SCRIPT ORACLE : LA TOOLBOX

```
-- Sessions actives
SELECT COUNT(*) FROM v$session WHERE status='ACTIVE';

-- Top wait events
SELECT event, total_waits, time_waited
FROM v$system_event
ORDER BY time_waited DESC FETCH FIRST 5 ROWS ONLY;

-- Tablespaces
SELECT tablespace_name, used_percent
FROM dba_tablespace_usage_metrics;
```

“Même sans OEM, je peux diagnostiquer la santé d’une base en 2 minutes.”

9. Supervision moderne

Outil

Complément Oracle

Prometheus

Métriques

Grafana

Dashboards

Centreon/Zabbix

Alerting

TOP 3 DES MEILLEURS OUTILS

PROMETHEUS

Vision & Architecture

Prometheus est un système de monitoring orienté métriques basé sur une base de données time-series.

Fonctionnement

1. Prometheus scrape des métriques via HTTP
2. Stocke les données en time-series
3. Permet requêtes via PromQL
4. Envoie alertes vers Alertmanager

Pourquoi c'est puissant pour un DBA

Avantage

Haute granularité

Historique long terme

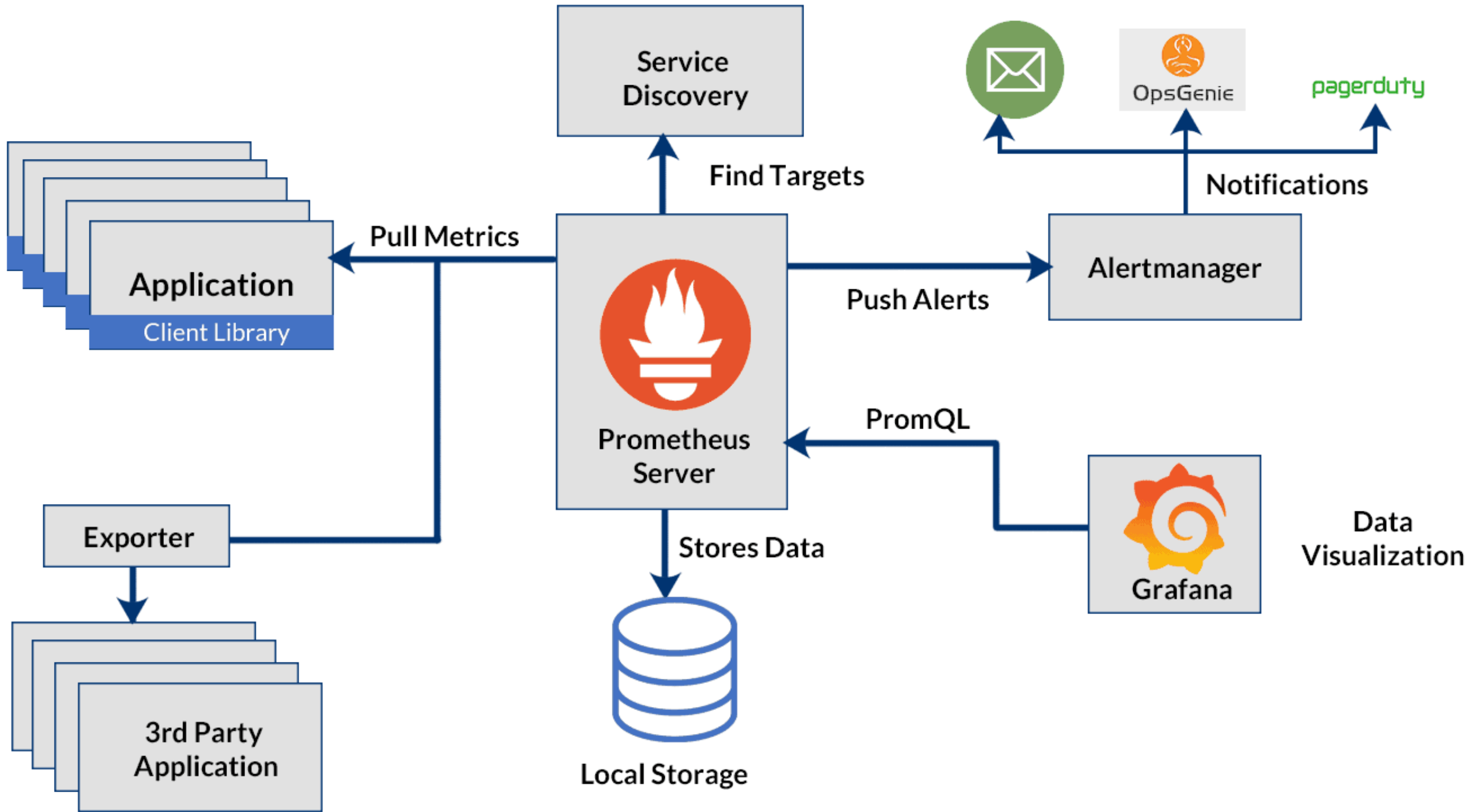
Modèle pull

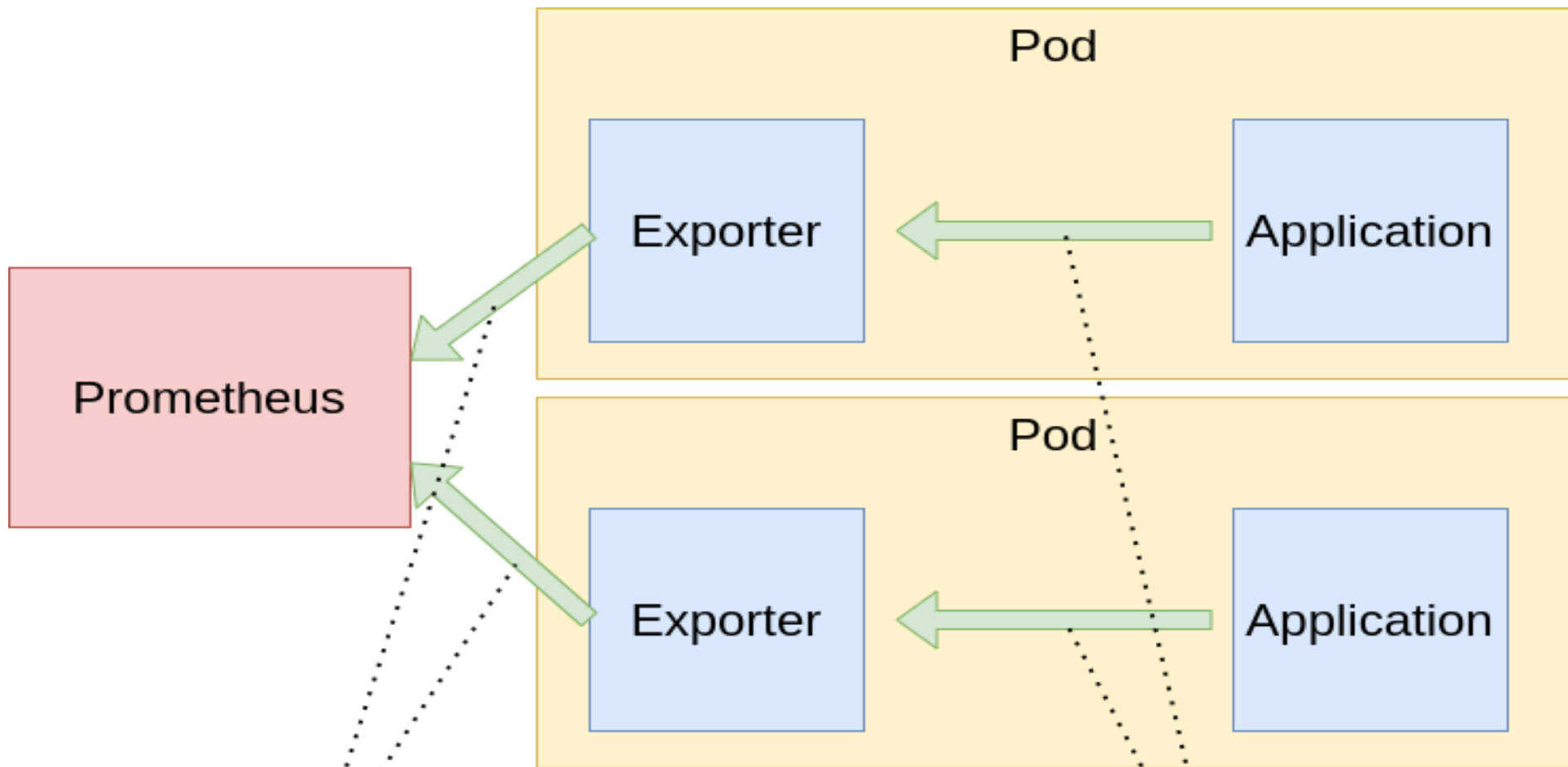
Impact DBA

Analyse fine perf DB

Capacity planning

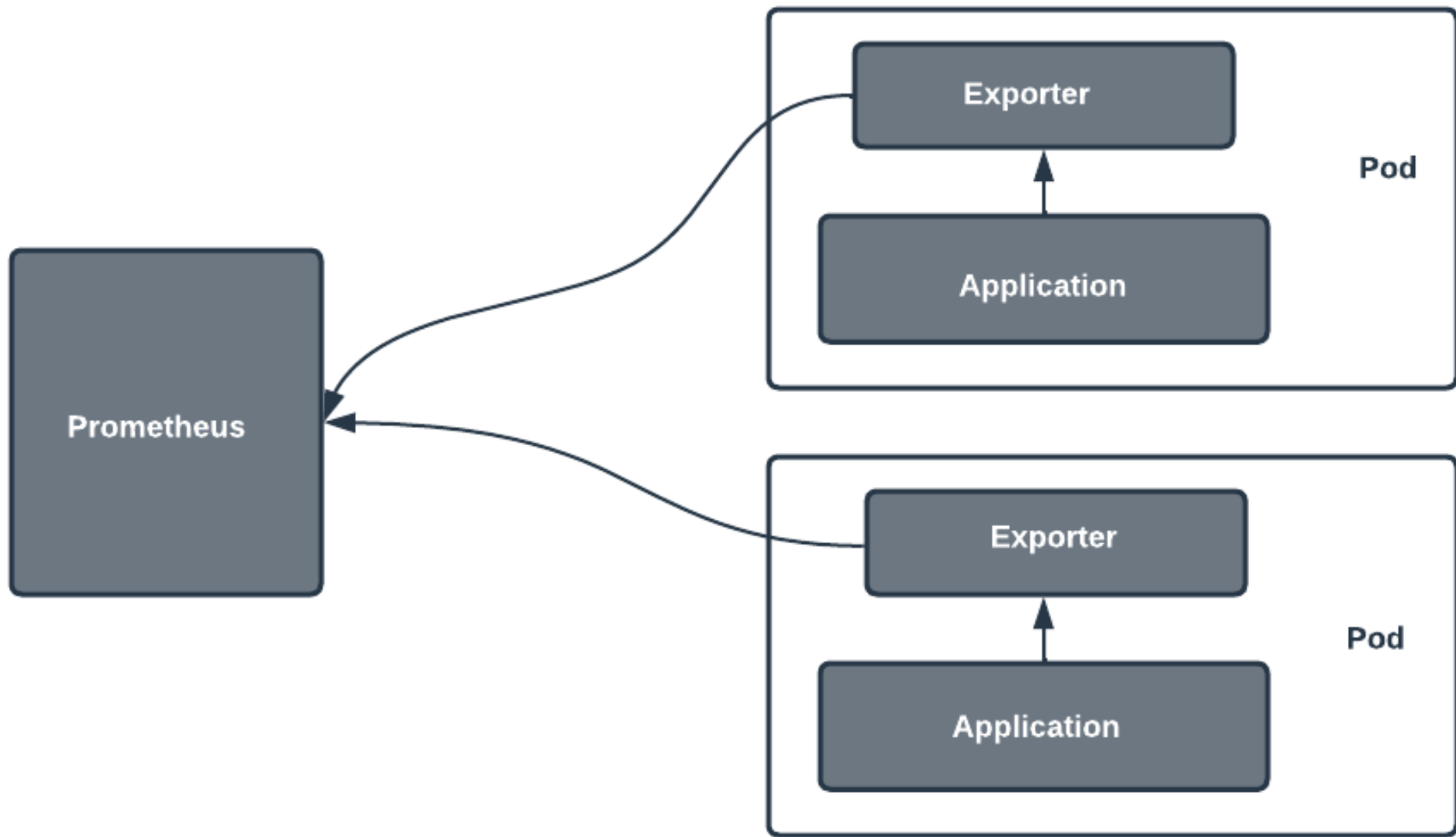
Sécurisé & simple





```
# HELP app_requests_current Current requests
# TYPE app_requests_current gauge
app_requests_current 33.0
# HELP app_requests_pending Pending requests
# TYPE app_requests_pending gauge
app_requests_pending 7.0
# HELP app_uptime Uptime
# TYPE app_uptime gauge
app_uptime 14383.0
# HELP app_health Health
# TYPE app_health gauge
app_health{app_health="healthy"} 1.0
app_health{app_health="unhealthy"} 0.0
```

```
{
  "current_requests": 27,
  "health": "healthy",
  "pending_requests": 8,
  "total_uptime": 14577
}
```



Métriques typiques

Domaine	Exemple
Sessions	Active sessions
Performance	DB time
I/O	Physical reads
Redo	Log switches
Tablespaces	% used

Exporters Oracle

Prometheus n'interroge pas Oracle directement.
On utilise un exporteur (ex: oracledb_exporter)

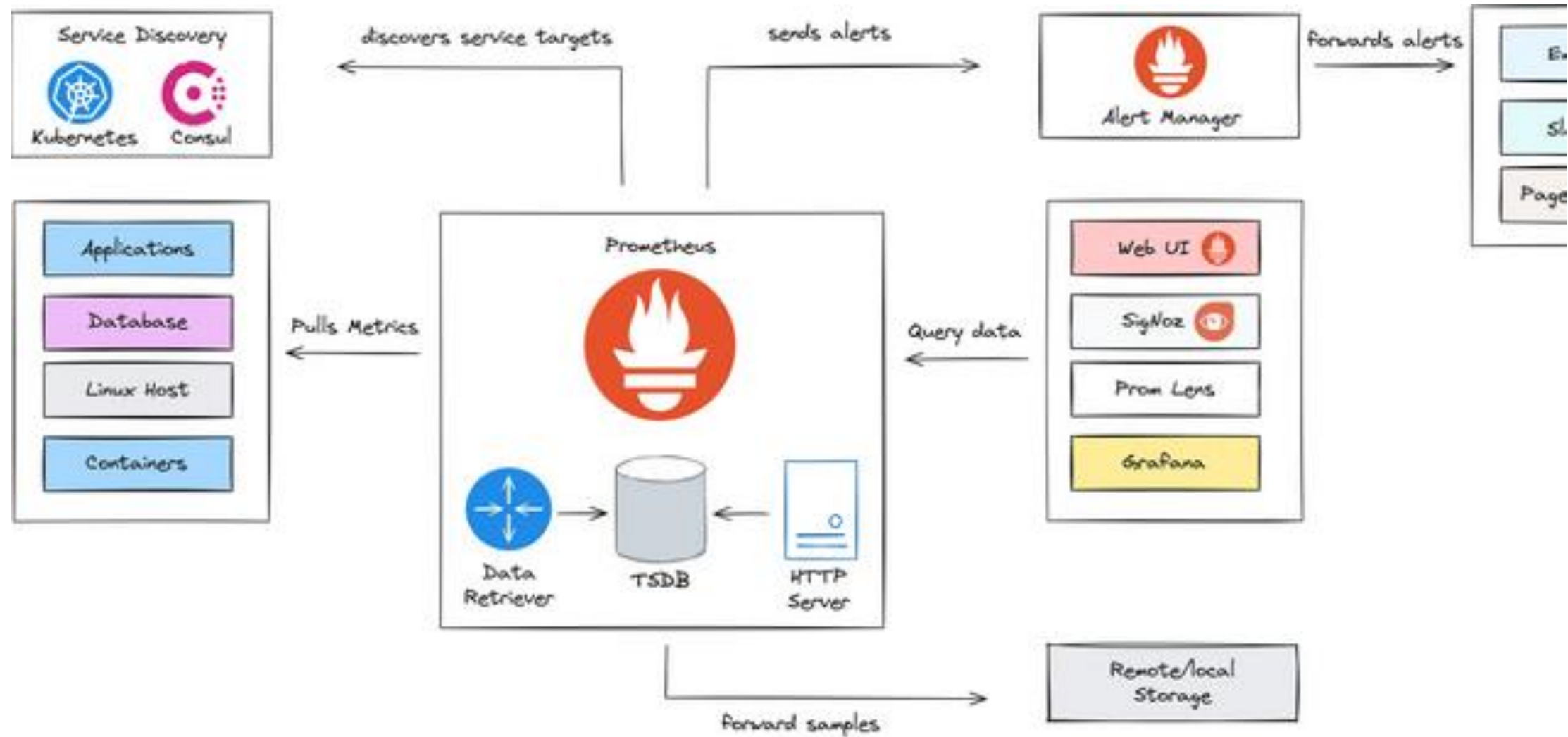
Cas réel

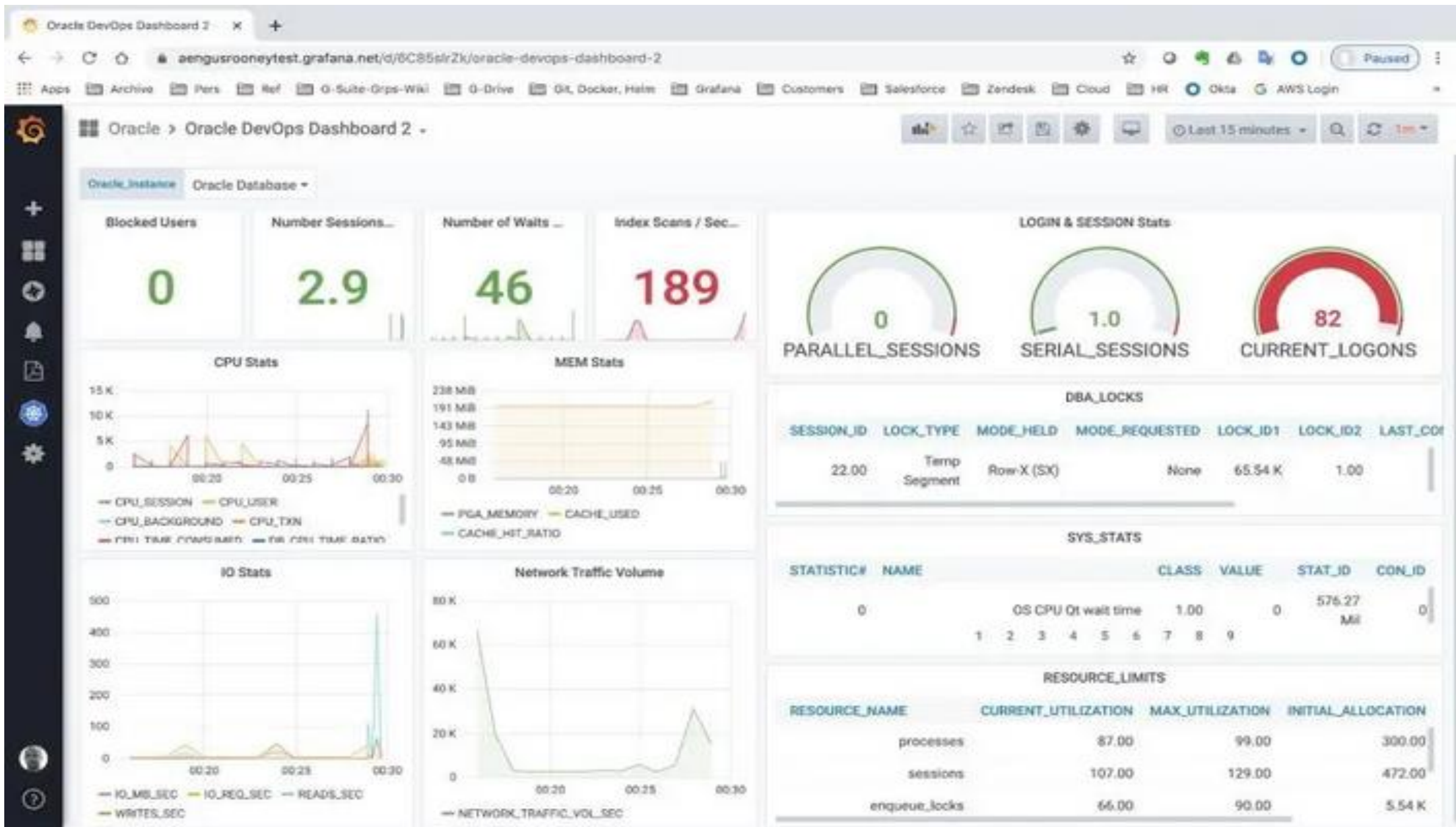
Pic CPU observé

- ➔ Corrélé à hausse sessions actives
- ➔ Lancement batch non maîtrisé

Prometheus & Oracle







Alerting & Capacity Planning

“Prometheus transforme les incidents en courbes... donc en décisions.”

Alertes possibles

Alerte	Exe
Tablespace > 85%	Sati
Sessions > seuil	Risc
Latence I/O	Déc

Capacity Planning

Grâce à l'historique Prometheus :

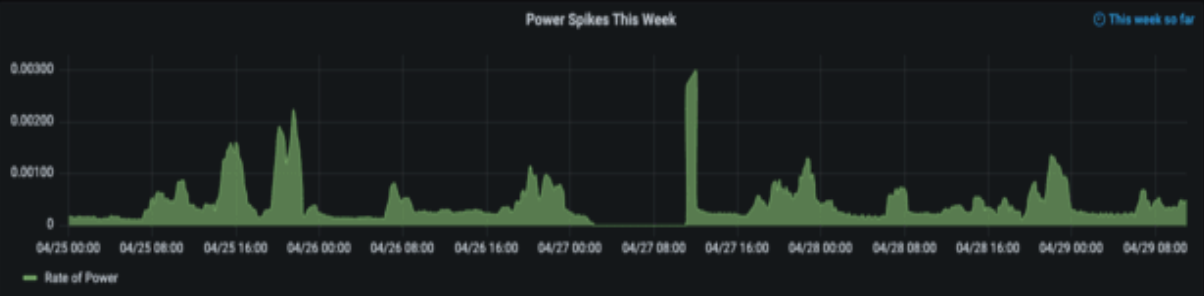
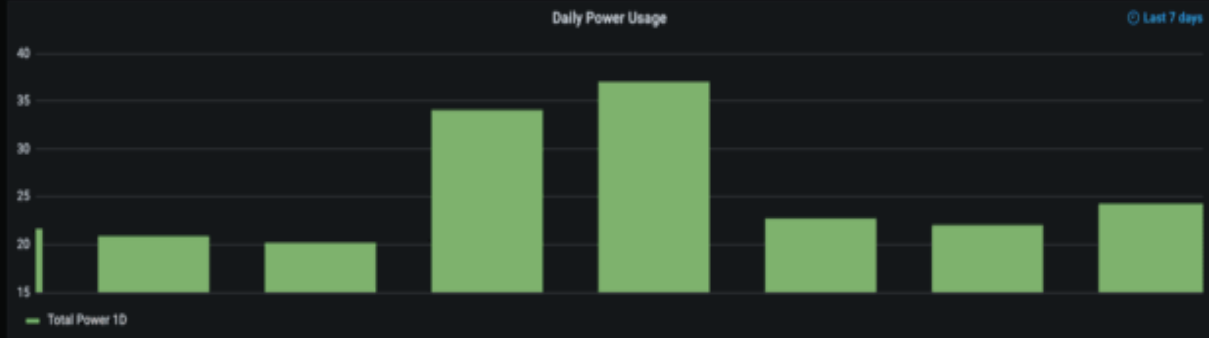
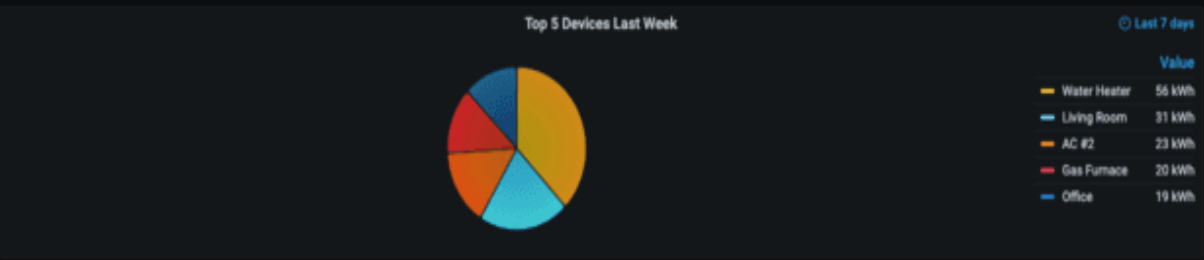
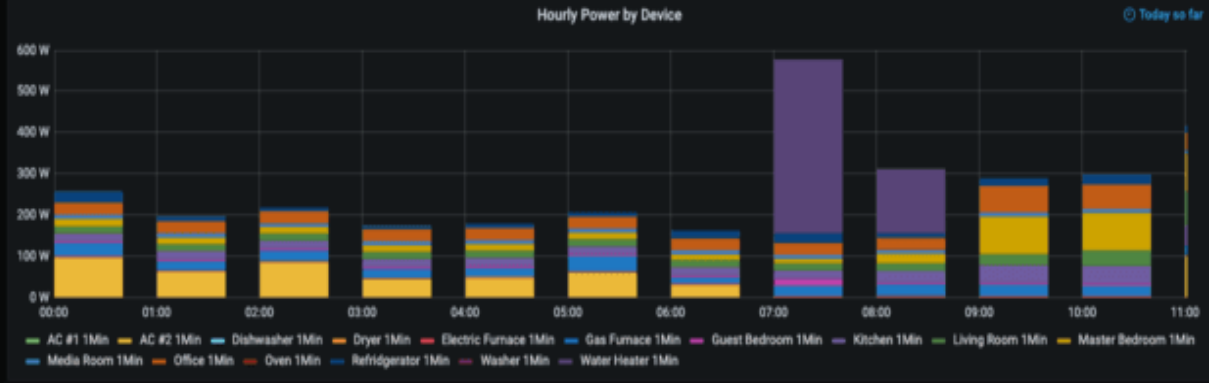
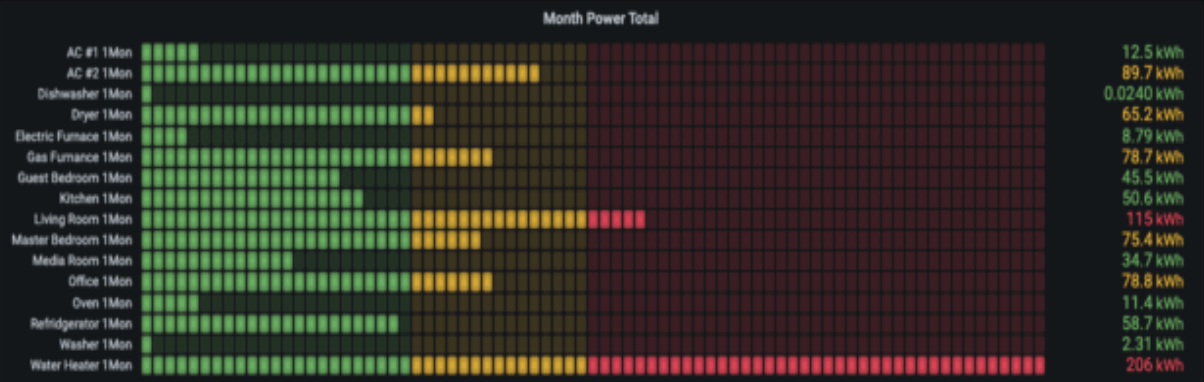
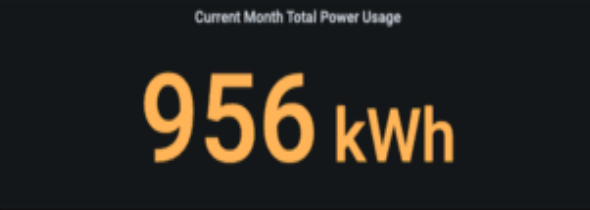
- Prévission stockage
- Charge CPU
- Croissance utilisateurs

GRAFANA

Grafana est un outil de **visualisation** connecté à Prometheus.

Rôle	Description
Dashboards	Temps réel
Graphiques	Corrélations
KPI	Vue management

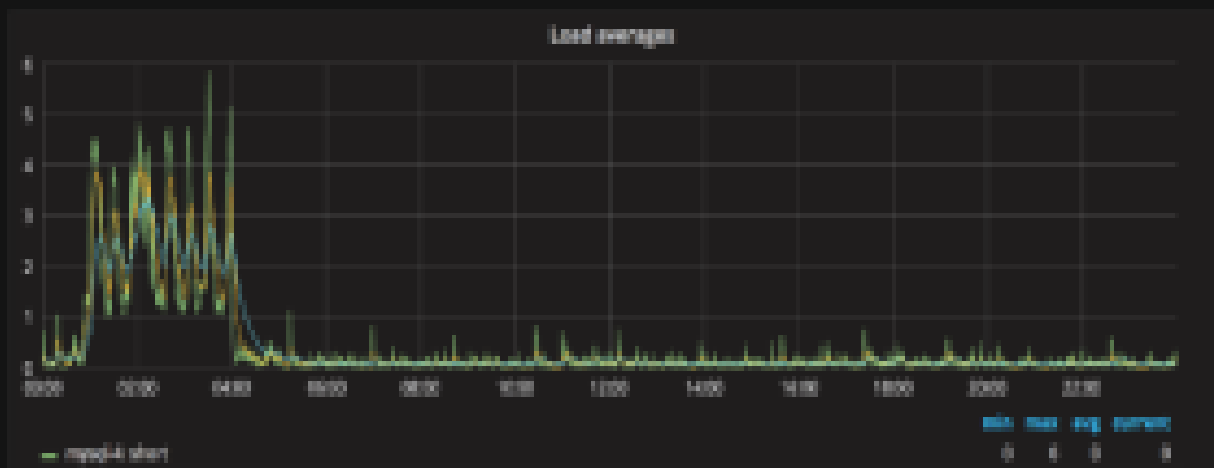
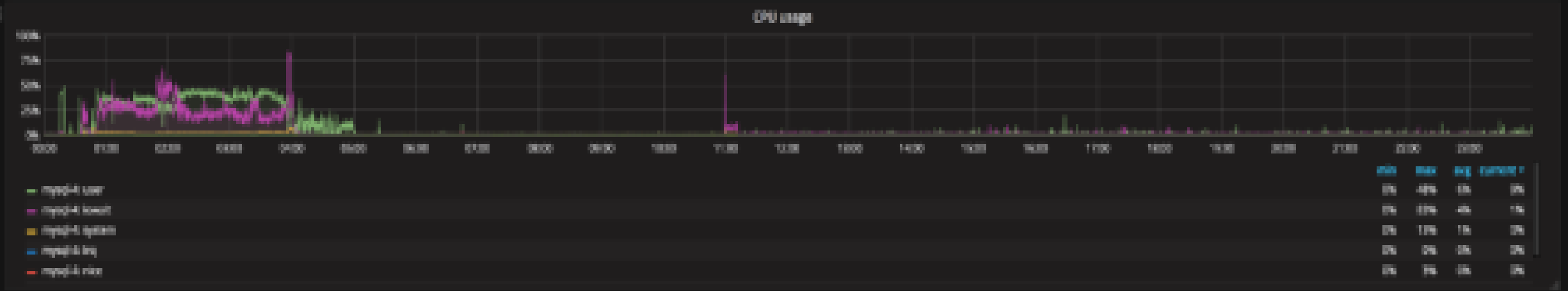
“Grafana transforme les métriques techniques en indicateurs compréhensibles.”

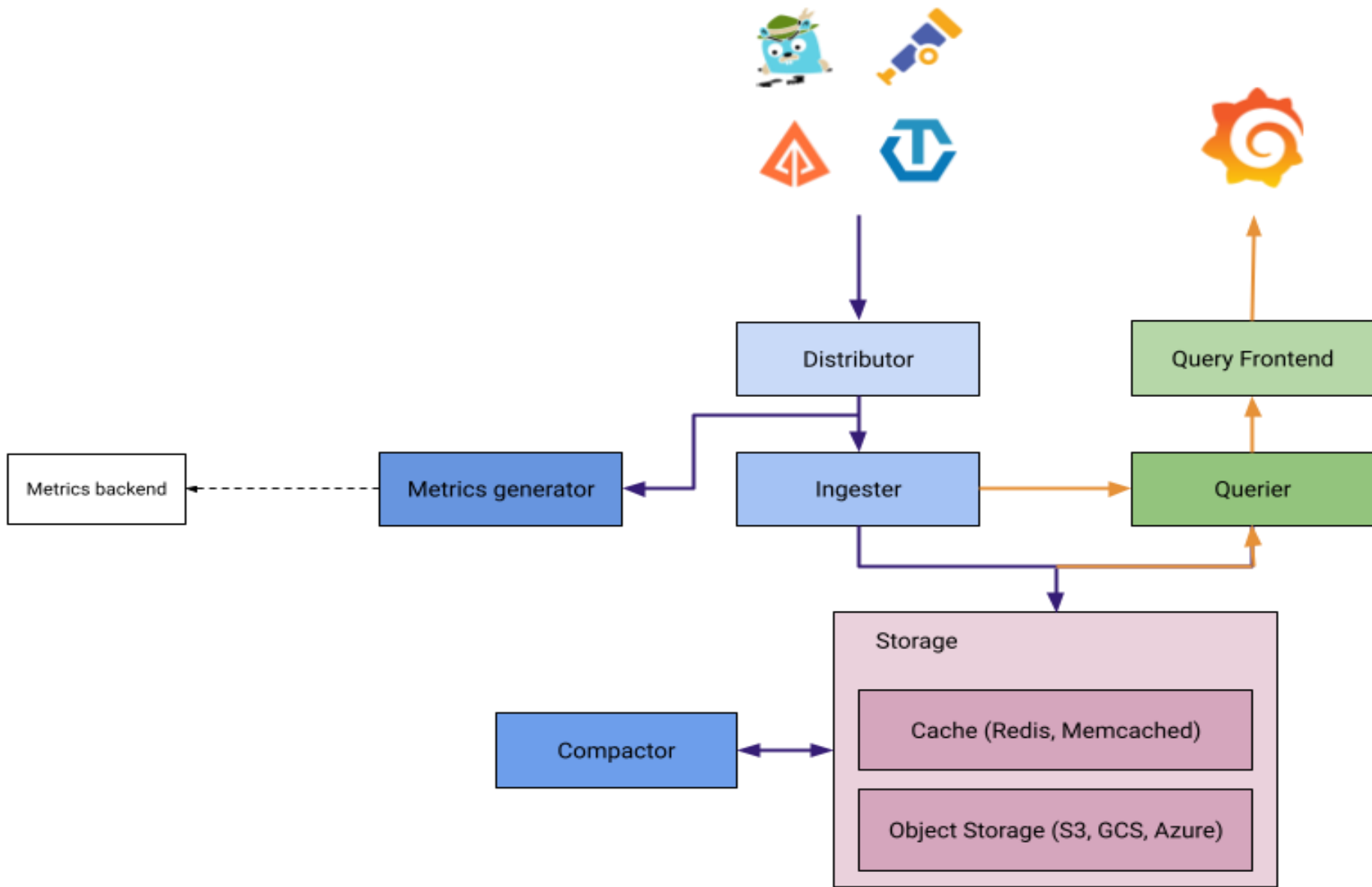


Quick overview



CPU







Dashboards DBA Oracle

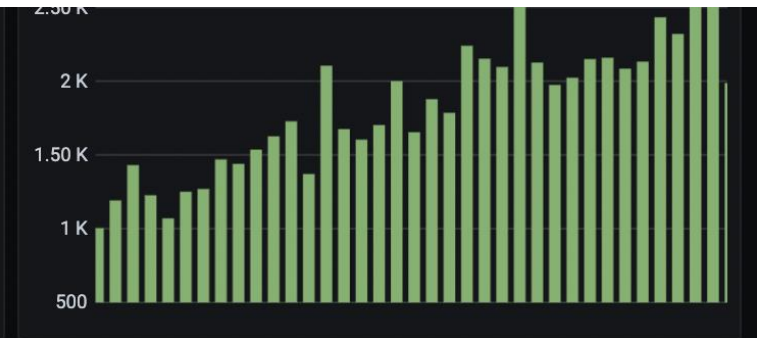
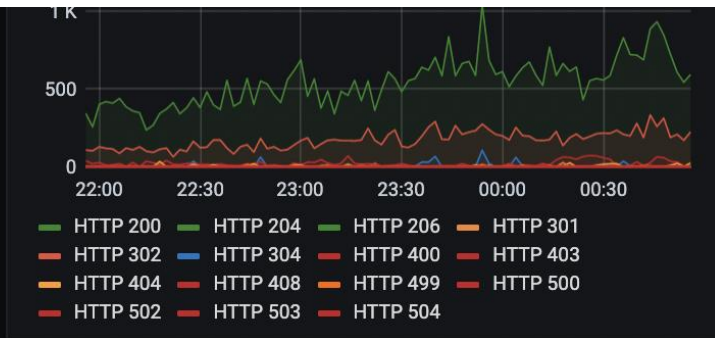
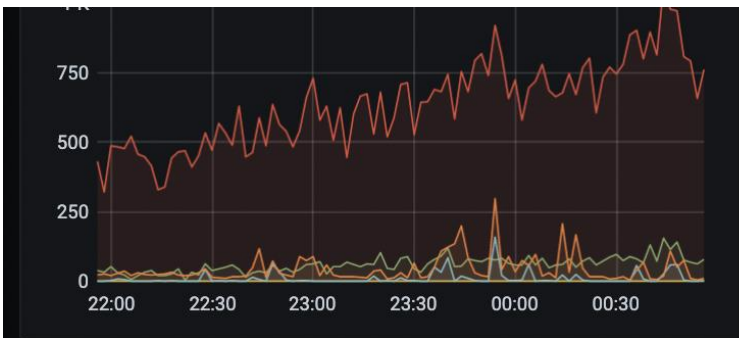
Dashboard type DBA

Panneau	Info
DB Time	Charge réelle
Top waits	Goulot
Sessions actives	Concurrence
I/O latency	Disque
Tablespaces	Espace

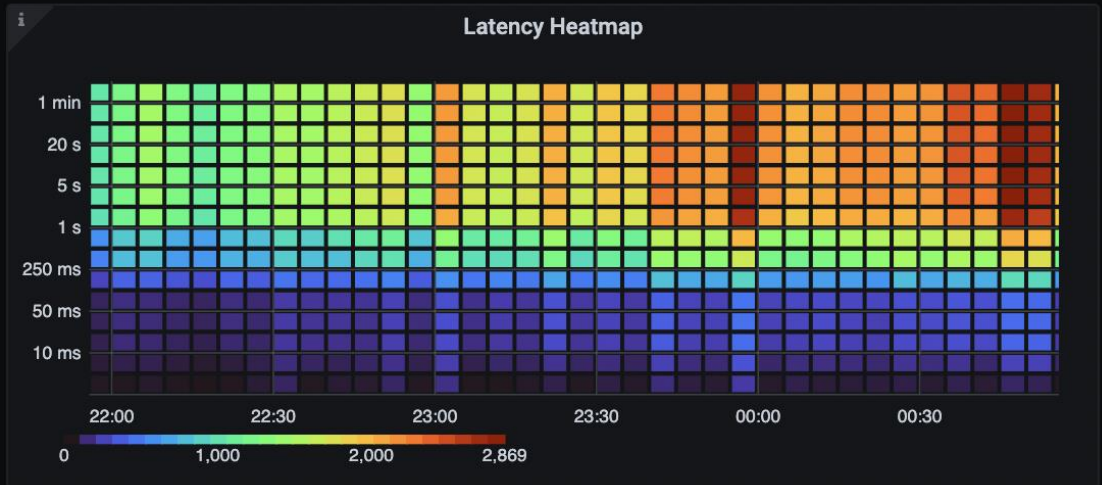
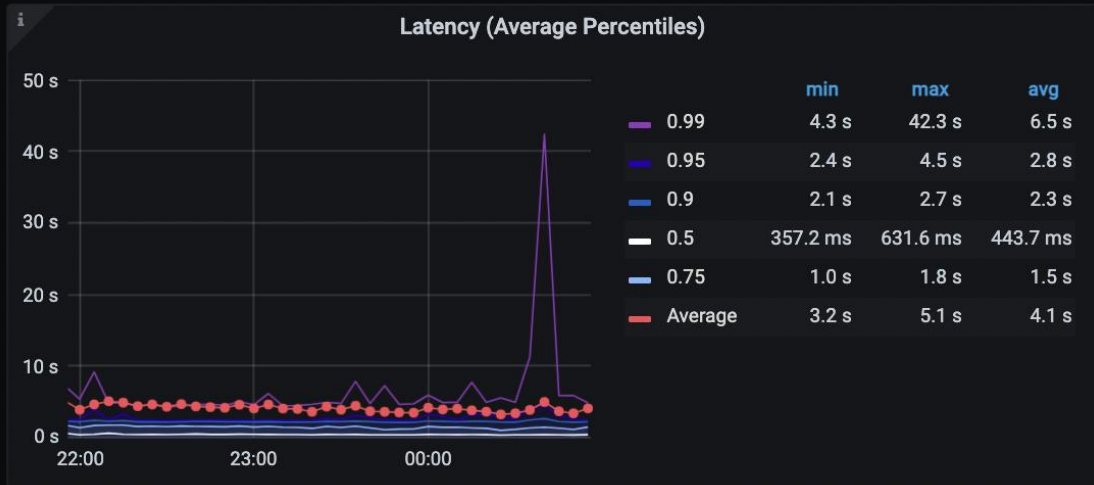
Cas réel

Grafana montre montée lente CPU + I/O

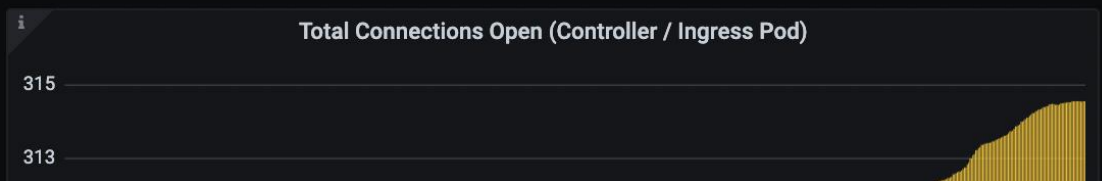
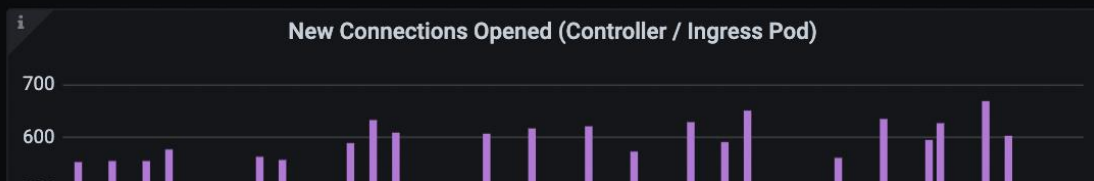
- ➔ Détection croissance progressive
- ➔ Ajout stockage avant incident

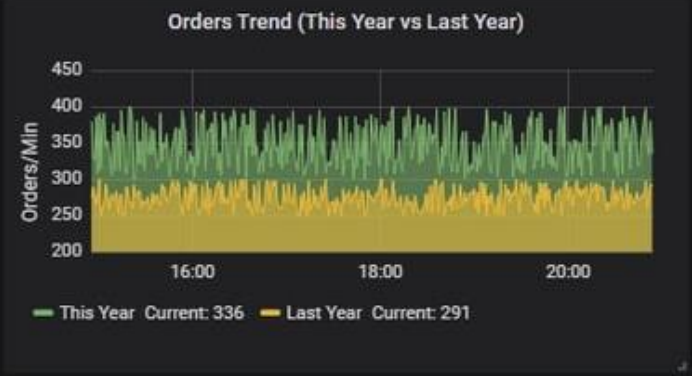
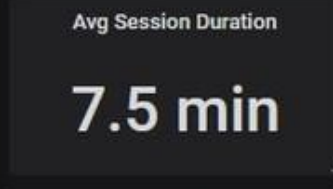
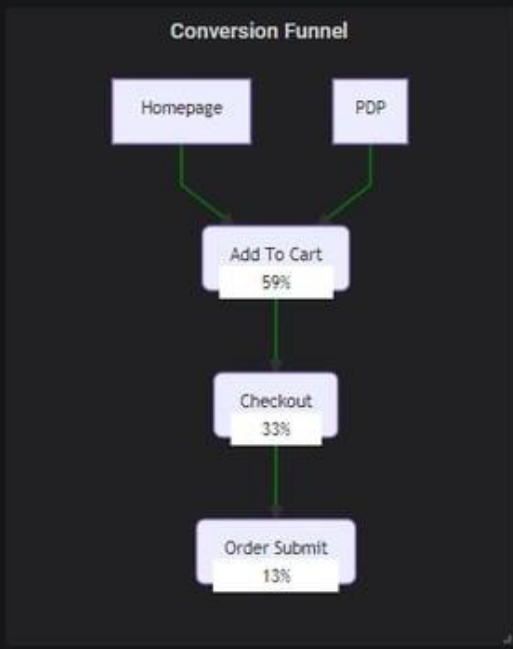
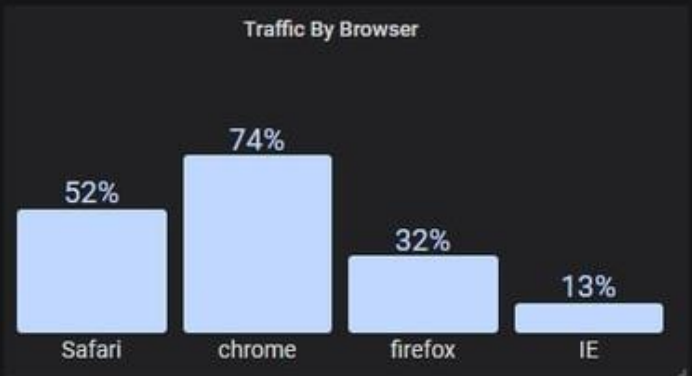


Latency



Connections





Public

Vue

DBA

Technique détaillé

CTO

Tendances & risques

DSI

Capacité & SLA

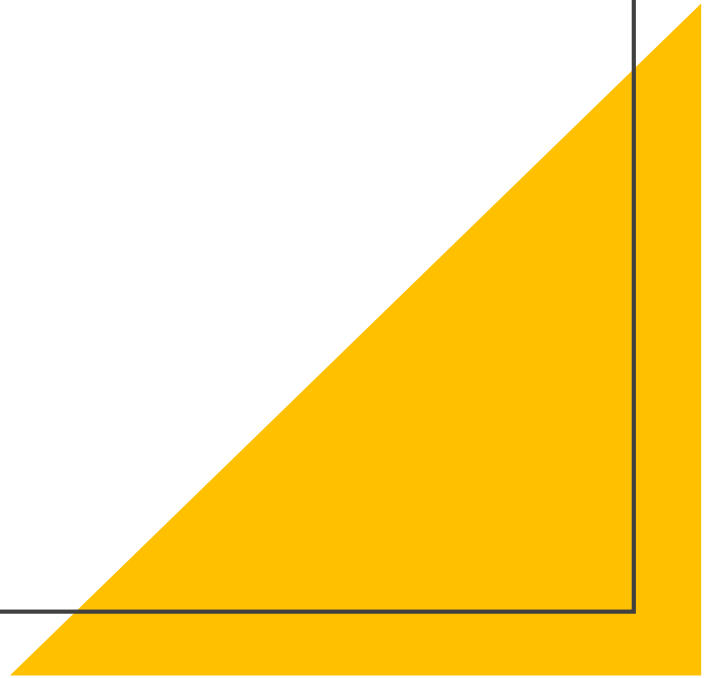
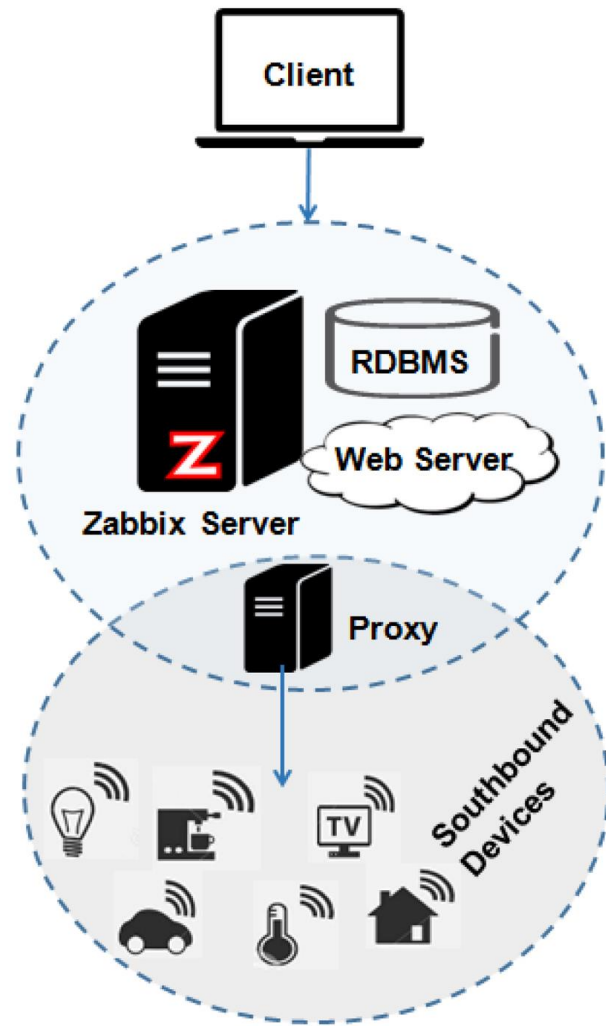
“Un bon dashboard évite 10 réunions de crise.”

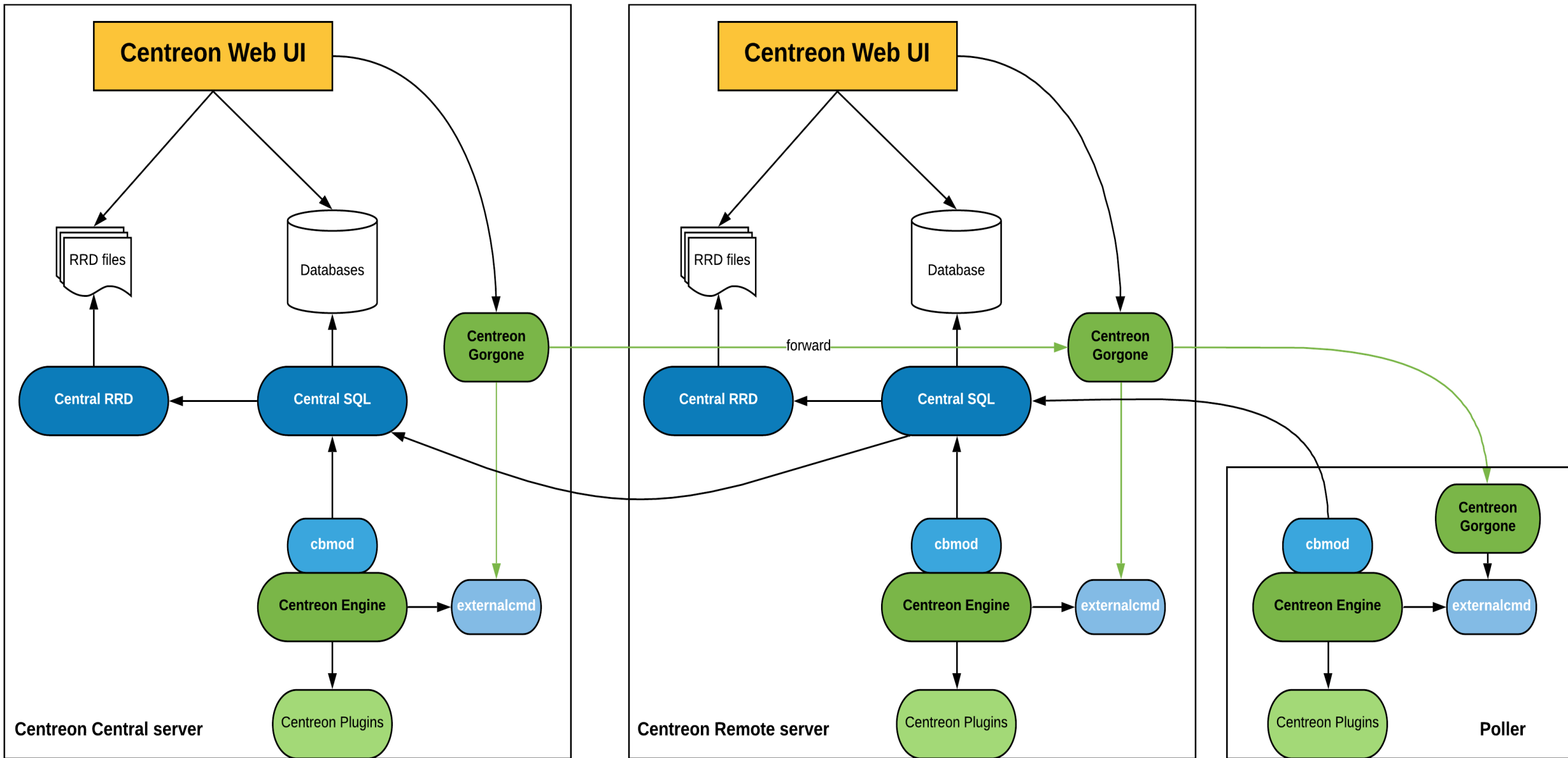
CENTREON / ZABBIX

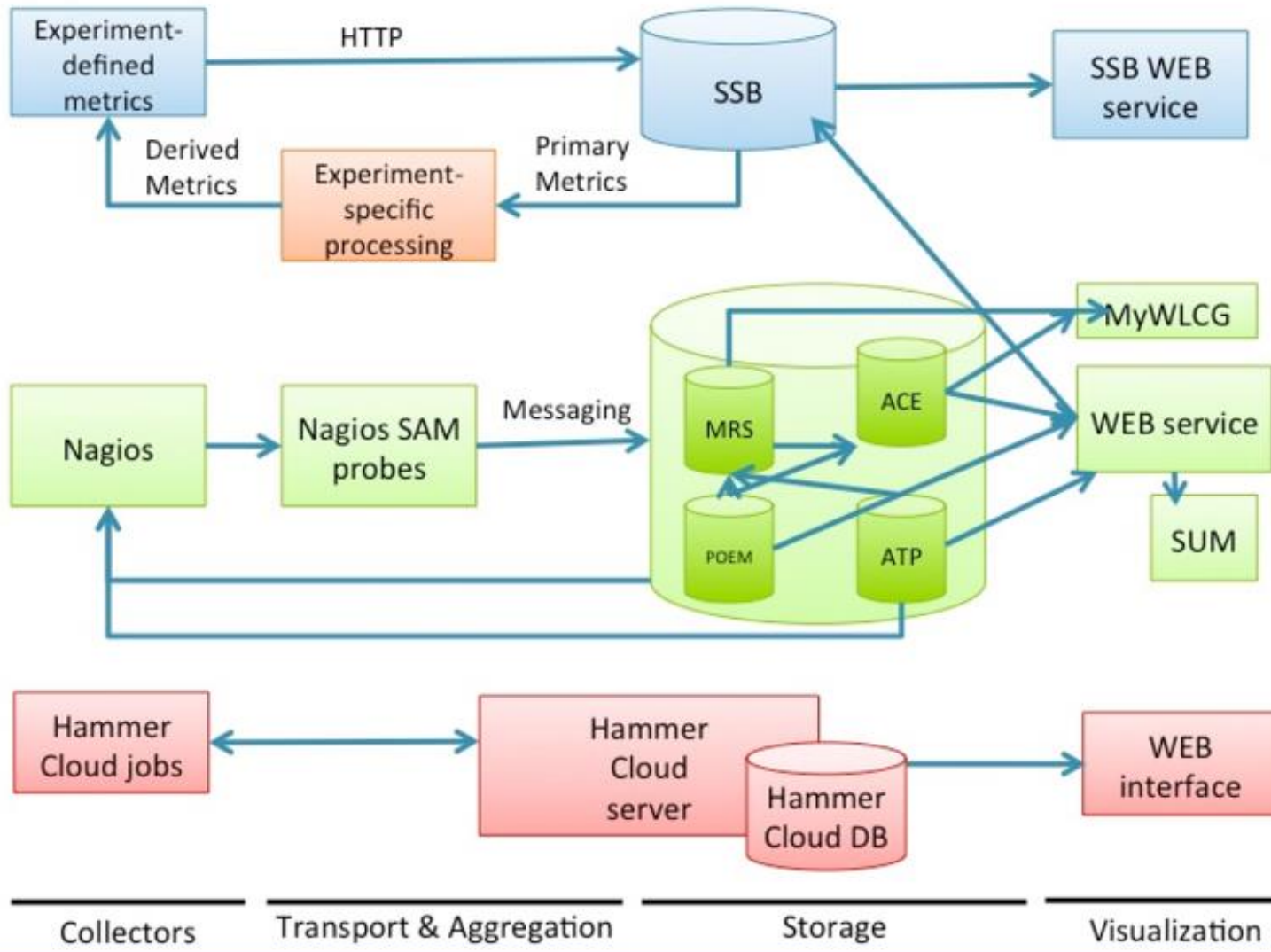


Vision & Architecture

Rôle	Usage
Serveurs	CPU, RAM
Réseau	Latence
Services	Disponibilité
DB	Ping & seuils







Exemples surveillés

Élément	Seuil
Listener down	Critique
Tablespace full	Alerte
Processus Oracle	Down
FRA saturation	Critique

“Ces outils détectent la panne, Prometheus explique pourquoi.”

Supervision Oracle avec Zabbix/Centreon

Global view

Edit dashboard

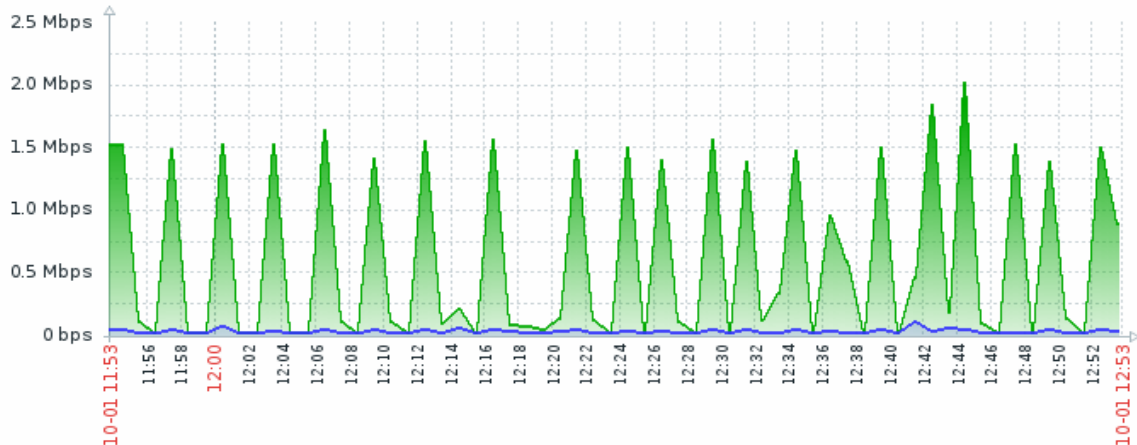
All dashboards / Global view

Zoom out Last 1 hour

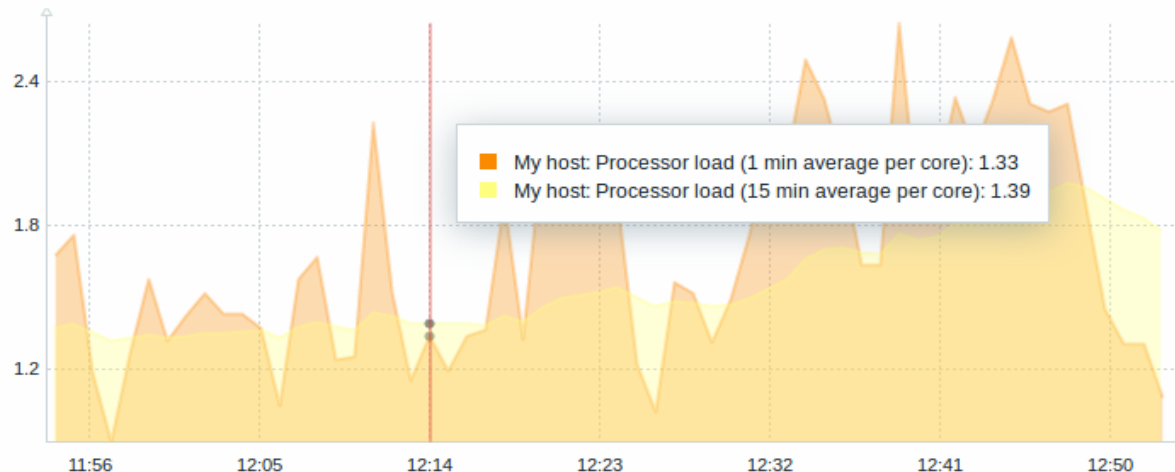
Problems

Time	Recovery time	Status	Info	Host	Problem • Severity	Duration	Ack	Actions	Tags
11:56:49		PROBLEM		My host	Free disk space is less than 20% on volume /	56m 56s	No		

Graph (classic)



Graph (new)



System information

Parameter	Value	Details
Zabbix server is running	Yes	localhost:10051
Number of hosts (enabled/disabled/templates)	83	2 / 0 / 81
Number of items (enabled/disabled/not supported)	120	114 / 0 / 6
Number of triggers (enabled/disabled [problem/ok])	65	65 / 0 [2 / 63]
Number of users (online)	2	1
Required server performance, new values per second	1.58	

Local



Discovery status

Discovery rule	Up	Down
Local network_2	17	

Web monitoring

Host group	Ok	Failed	Unknown
	No data found.		

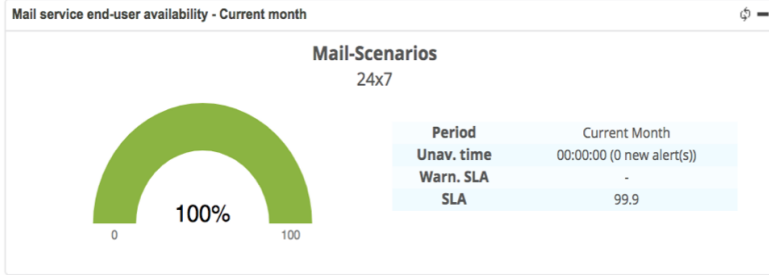
Problems by severity

Host group	Disaster	High	Average	Warning	Information	Not classified
Discovered hosts				1		
Zabbix servers				1		

Home

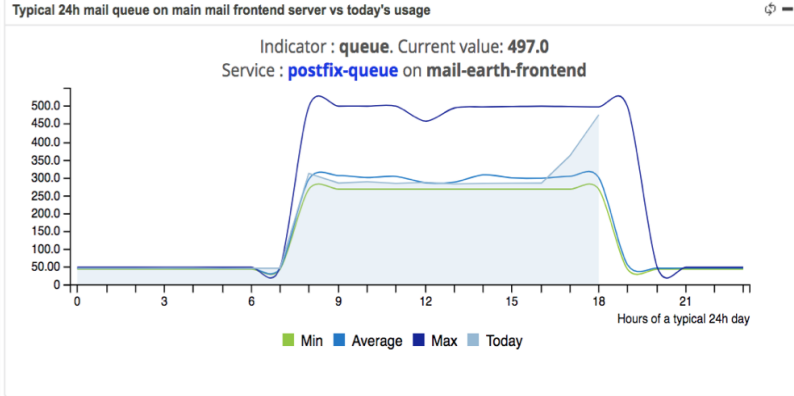
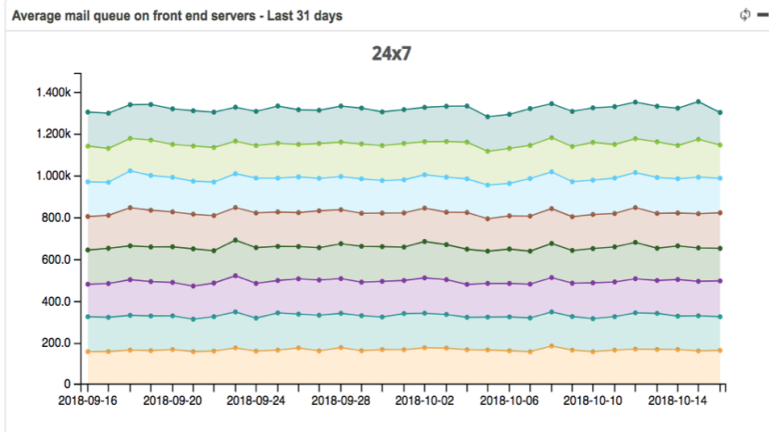
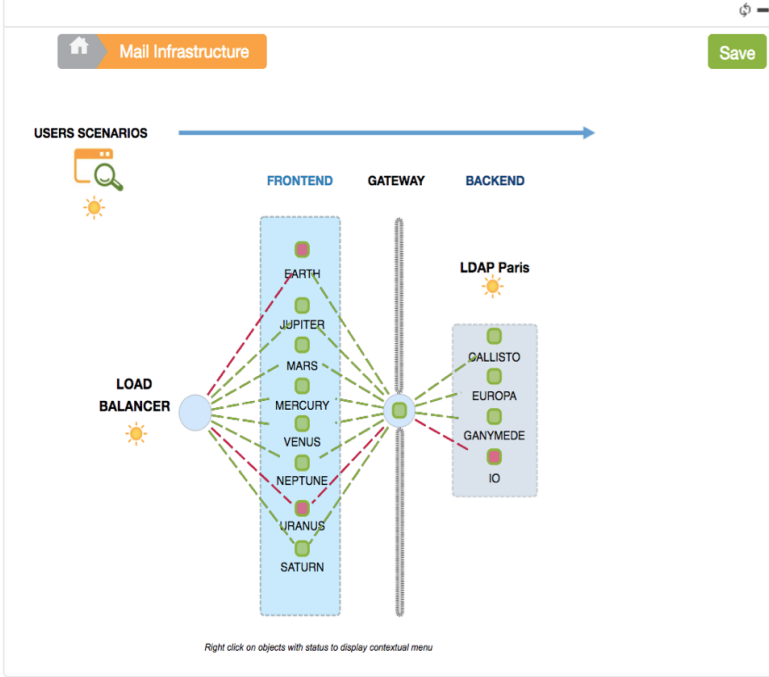
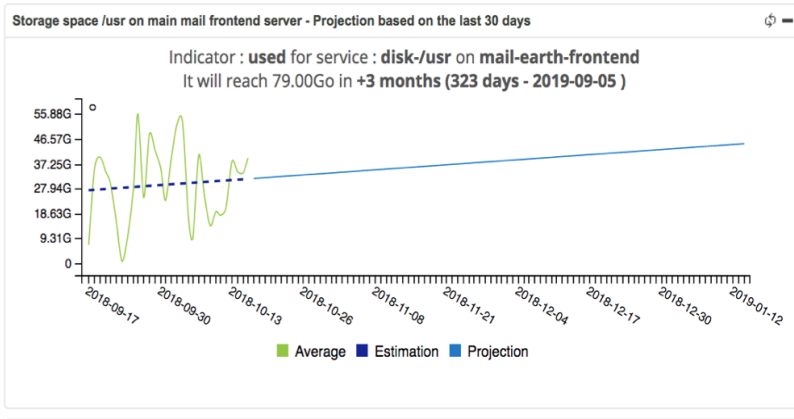
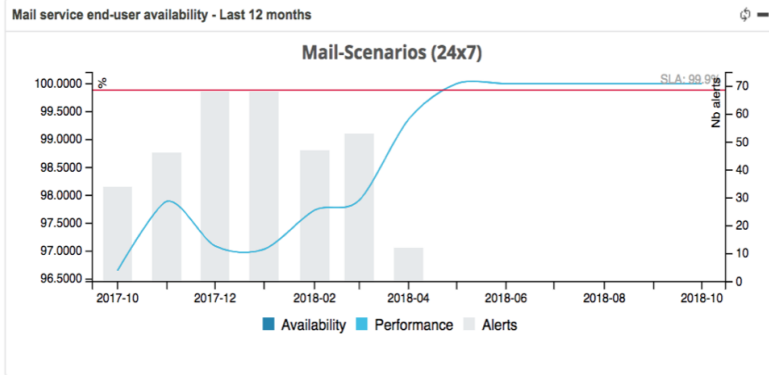
Main MAIL service components' health

Name	Status	Since	Current Level
Mail-Masters	Not available	28m 14s	0%
Mail-IDF	Not available	34m 2s	0%
Mail - User Experience	Degraded	8m 2s	50%
Mail-Frontends	Degraded	1h 16m	60%
Load-Balancer-Mail-IDF	Available	1h 57m	100%
Mail-Gateways	Available	1h 38m	100%
Mail-Scenarios	Available	8m 2s	100%
Mail-Backends	Available	56m 11s	100%



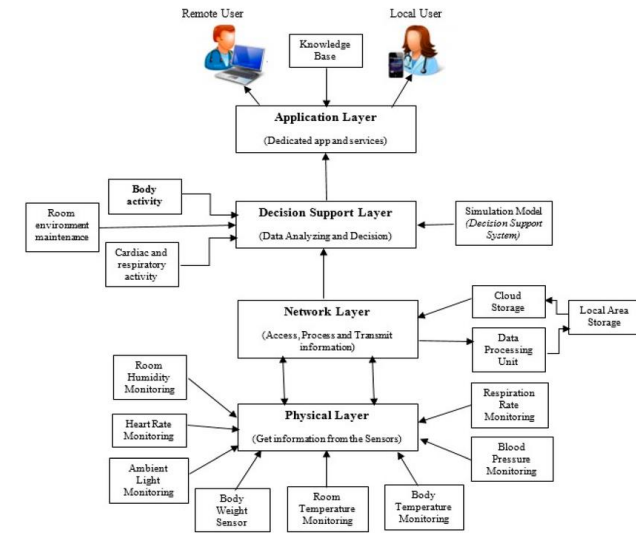
Risky storage spaces evolution on mail servers

Resources	Est. saturation	Evol. vs yesterday	Current usage
mail-jupiter-frontend - disk-/	29.3 days	-52.64%	19.15%
mail-earth-frontend - disk-/	31.4 days	88.99%	71.91%
mail-neptune-frontend - disk-/	44.2 days	81.65%	69.74%
mail-uranus-frontend - disk-/	60.4 days	-32.37%	26.62%



Complémentarité avec Prometheus

“Un DBA moderne combine supervision événementielle et métrique pour une vision complète.”

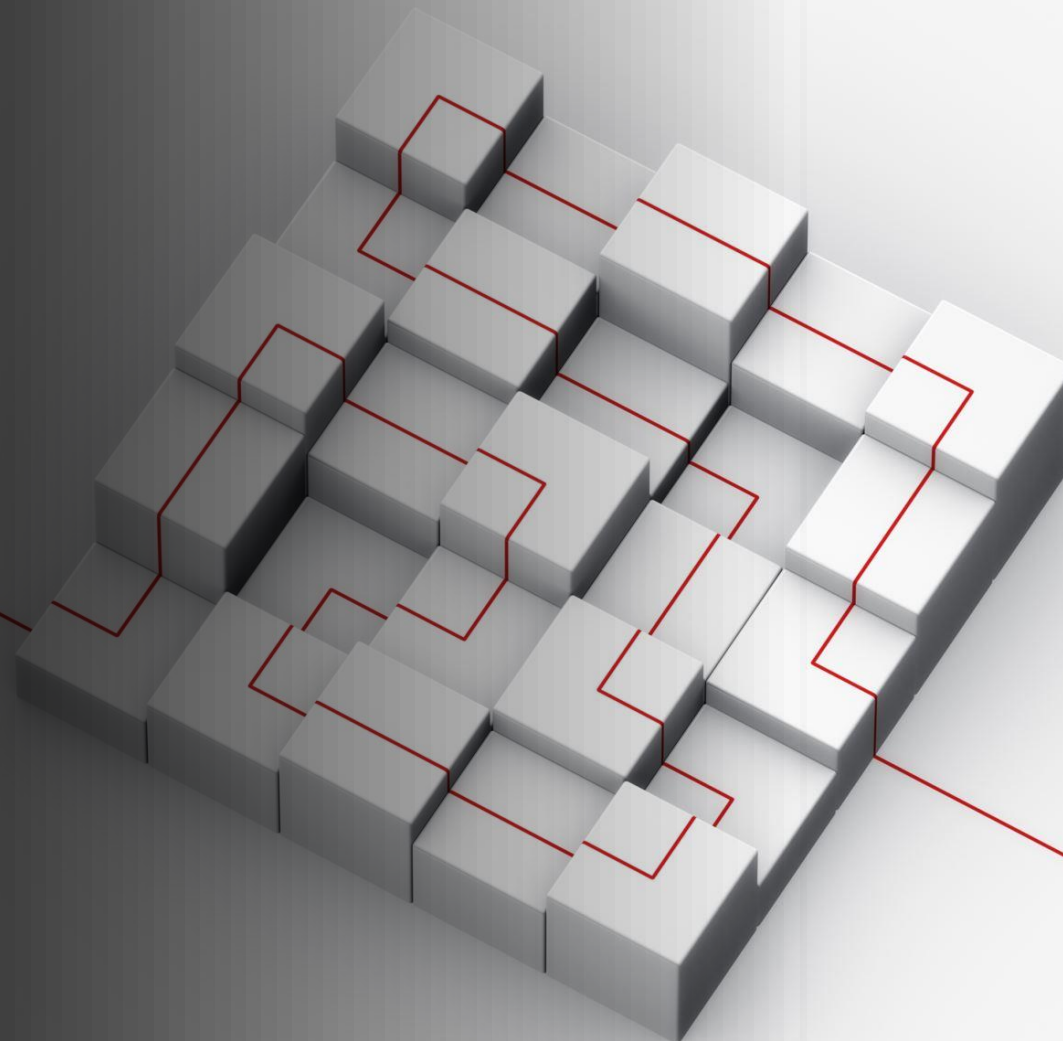


Outil	Rôle
Zabbix/Centreon	Alerte incident
Prometheus	Analyse métrique
Grafana	Visualisation



8

Maintenance & Exploitation Quotidienne



8 – MAINTENANCE & EXPLOITATION QUOTIDIENNE ORACLE

- 1. Le rôle du DBA en RUN
- 2. Mise à jour des statistiques Optimizer
- 3. Surveillance des tablespaces
- 4. Gestion des index
- 5. Purge & Housekeeping
- 6. Gestion des sessions et verrous
- 7. Vérification des jobs et batchs
- 8. Contrôle des sauvegardes
- 9. Patch management (RU/RUR)
- 10. Checklist quotidienne DBA



1. Le rôle du DBA en RUN

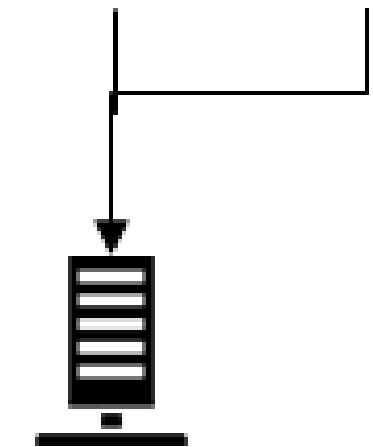


Un DBA ne fait pas que du tuning ou du PRA. Il assure la santé continue de la base.

Le rôle du DBA en RUN

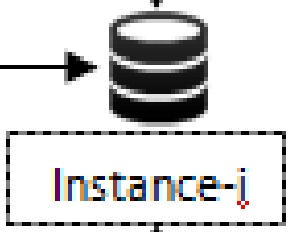
Domaine	Objectif
Stabilité	Pas d'incidents
Performance	Pas de dérive
Sécurité	Conformité
Capacité	Pas de saturation

User Application

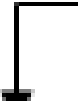


Application Server

Get Access

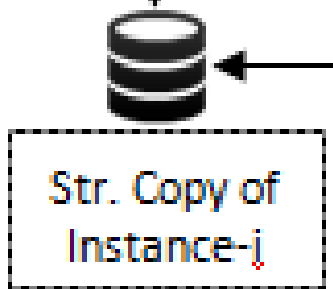


Data Processing



Database Server

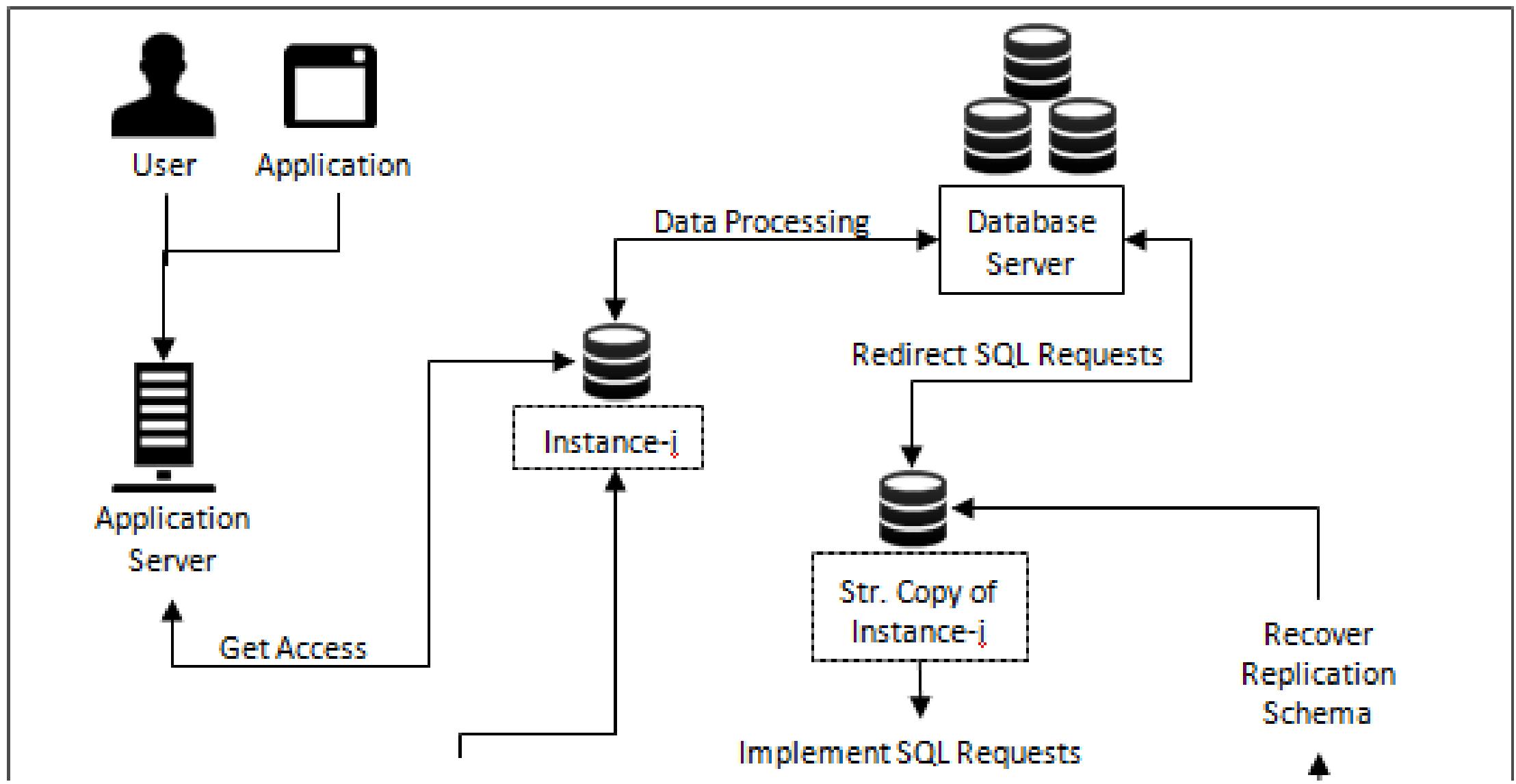
Redirect SQL Requests



Implement SQL Requests



Recover Replication Schema



Database maintenance

- Ensure that evolving information requirements are met
- Add, delete, or changes characteristics of the structure of a database in order to:
 - meet changing business conditions
 - correct errors
 - improve performance.
- Fix errors and recover database when it is contaminated

Database implementation

- Create and test the database
- Complete database documentation and training materials
- Install database and convert data from prior systems

Enterprise modeling

- Analyze current data processing
- Analyze the general business functions and their database needs

Conceptual data modeling

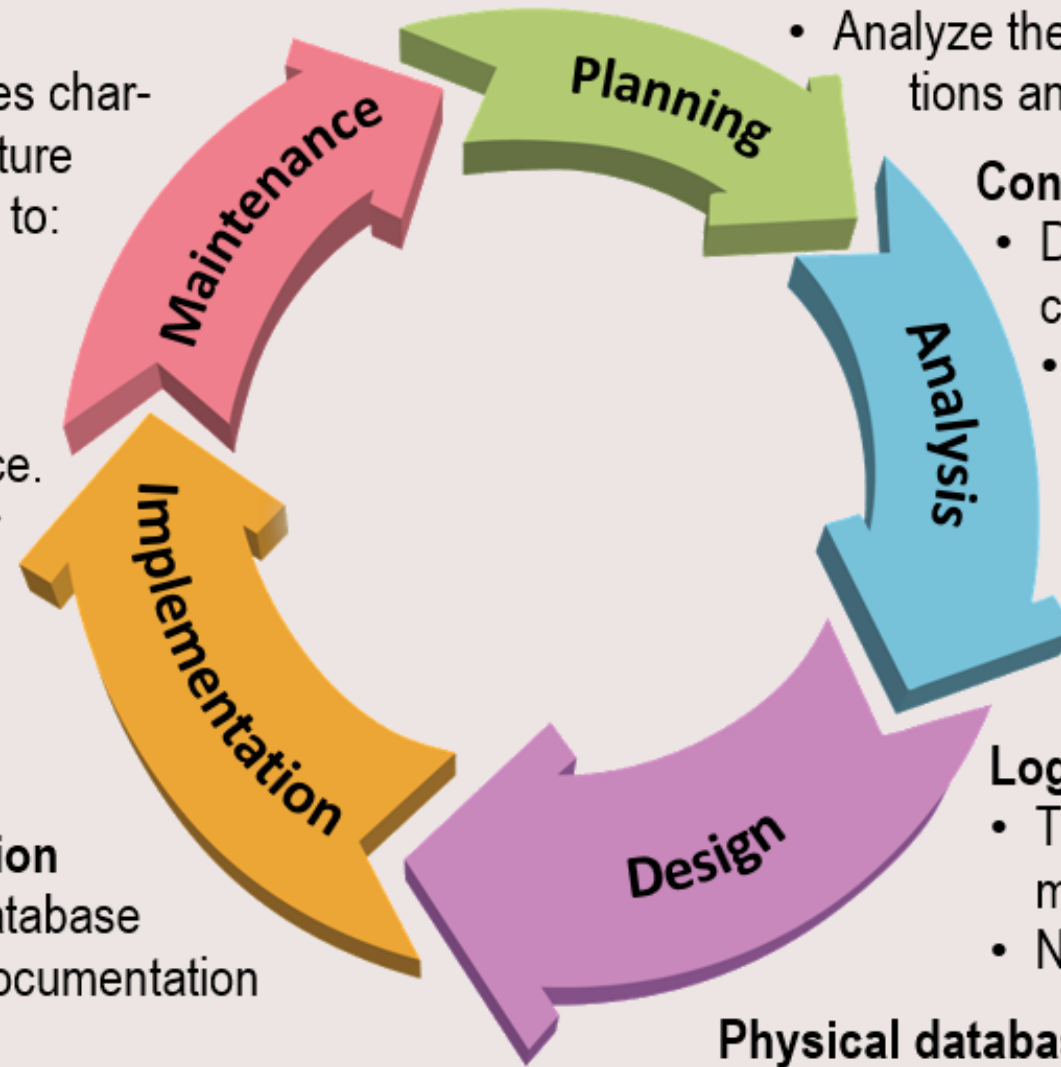
- Develop preliminary conceptual data model.
- Compare preliminary conceptual data model with enterprise data model
- Develop detailed conceptual data model

Logical database design

- Transform conceptual data model into relations
- Normalization

Physical database design

- Specify the organization of physical records, the choice of file organizations, and the use of indexes



2. Mise à jour des statistiques Optimizer

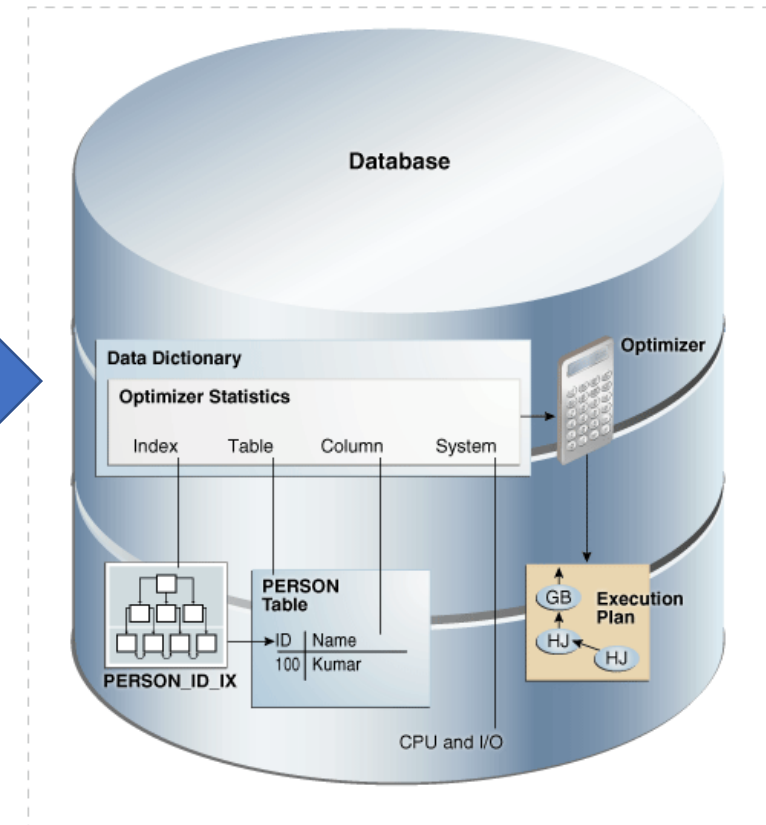
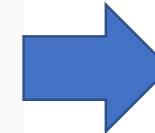


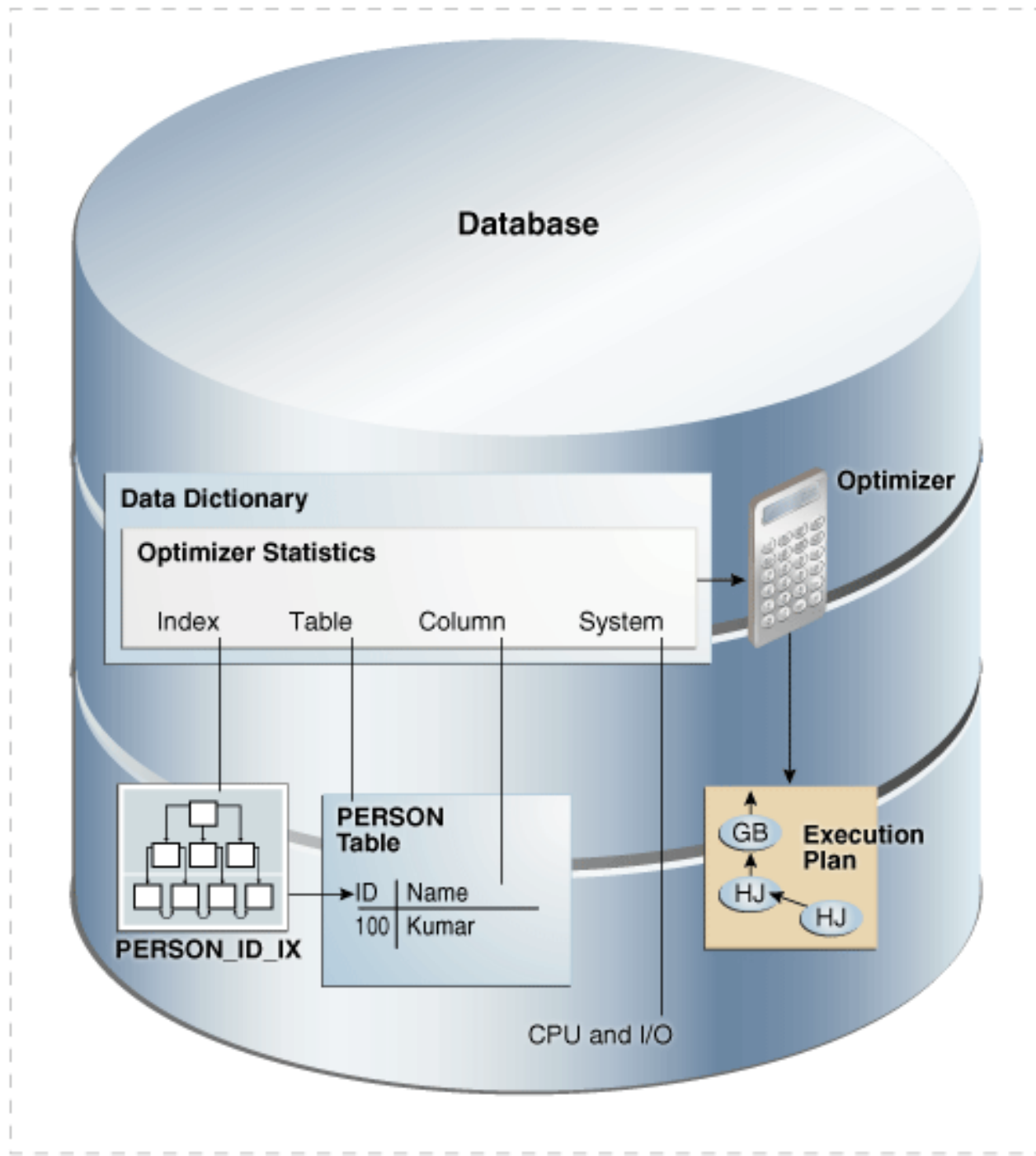
Mise à jour des statistiques Optimizer

Sans stats à jour → plans SQL dégradés

“Une base sans statistiques à jour, c’est un GPS sans carte.”

```
EXEC DBMS_STATS.GATHER_DATABASE_STATS;
```







16 SELECT STATEMENT

I/O Cost: 52671
Cost: 52770
In-Out:

100%

991MB

32%

4632200

I/O Cost

I/O cost of the operation as estimated by the query optimizer's approach. The value of this column is proportional to the number of data blocks read by the operation.

15 MERGE JOIN CARTESIAN

I/O Cost: 52671
Cost: 52770
In-Out:

67%

991MB

32%

185288

25

12 HASH JOIN

"E"."DEPARTMENT_ID"="D"."DEPARTMENT_ID"

I/O Cost: 2487
Cost: 2490

2%

14 BUFFER SORT

I/O Cost: 52668
Cost: 52767

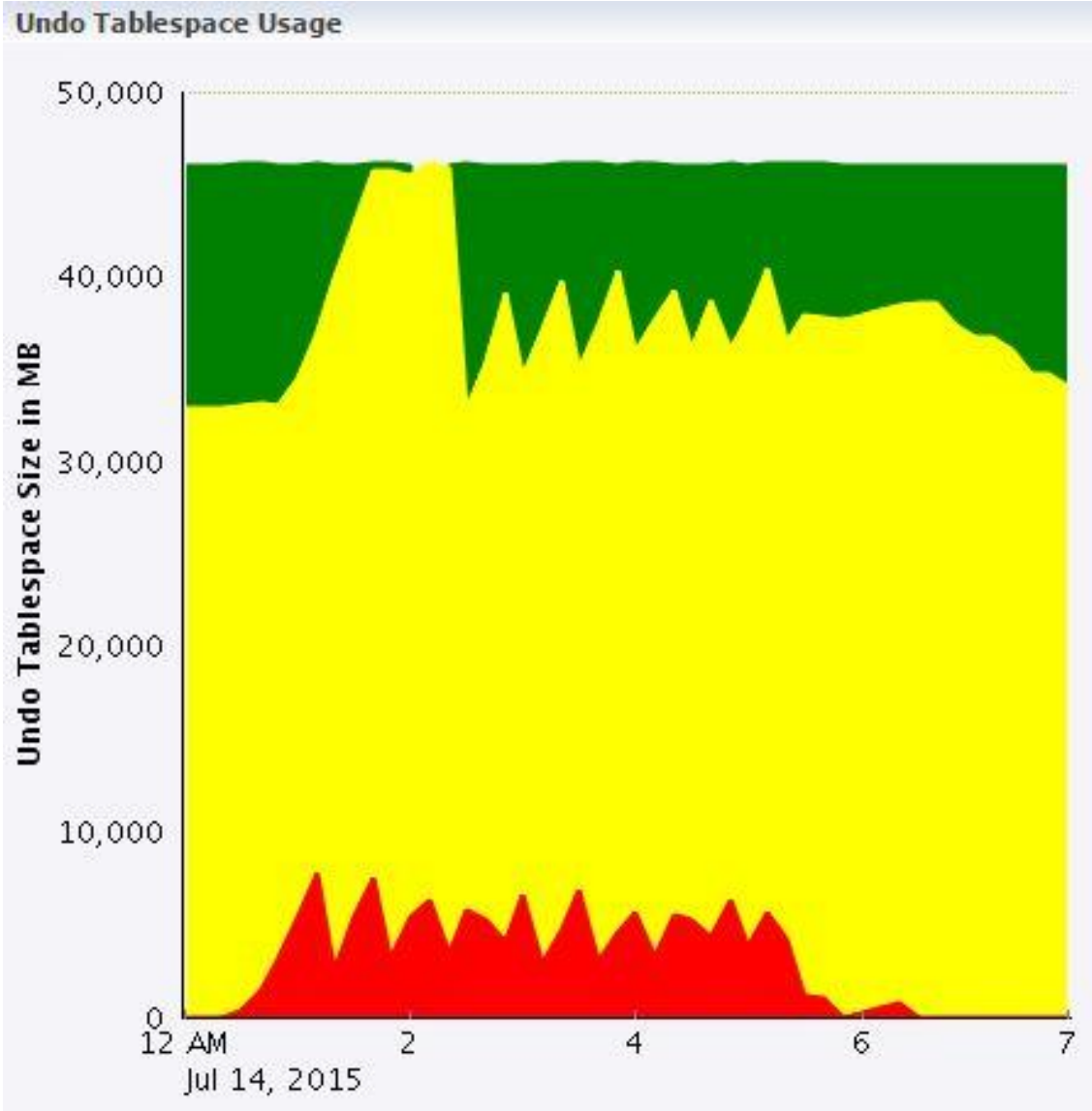
32%

- Patching (RU/RUR)
- Gestion des stats
- Rebuild / coalesce d'index
- Purge AWR / Audit
- Gestion de l'espace (tablespaces)



3. Surveillance des tablespaces

Surveillance des tablespaces



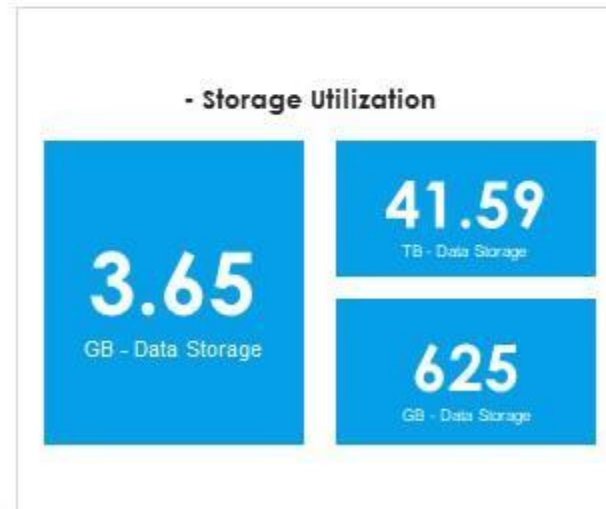
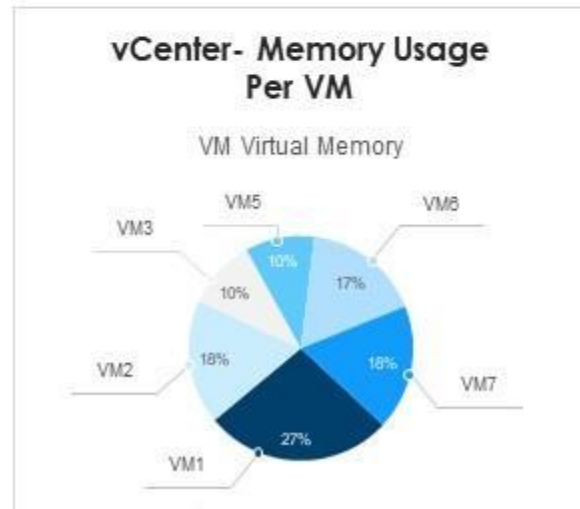
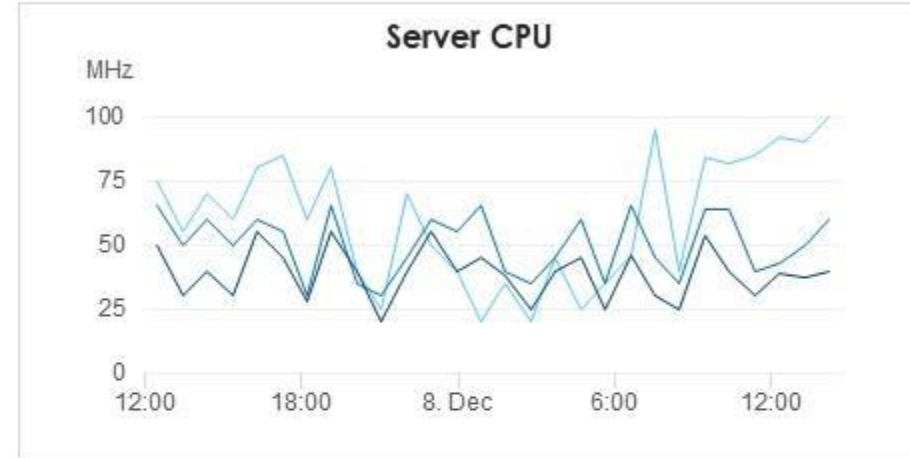
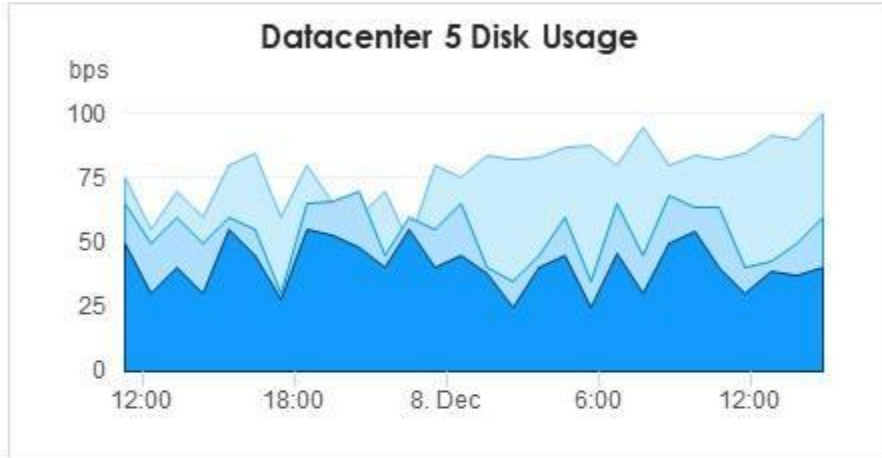
```
SELECT tablespace_name, used_percent  
FROM dba_tablespace_usage_metrics;
```

Action avant 90%

Sinon → blocage DML

Dashboard for Data Storage and Server Usage Monitoring

Below dashboard depicts major statistics based on data storage and server usage of cloud for better optimizing cloud components in order to reduce overall cost.



Key Takeaways

- > Your text here
- > Your text here
- > Your text here

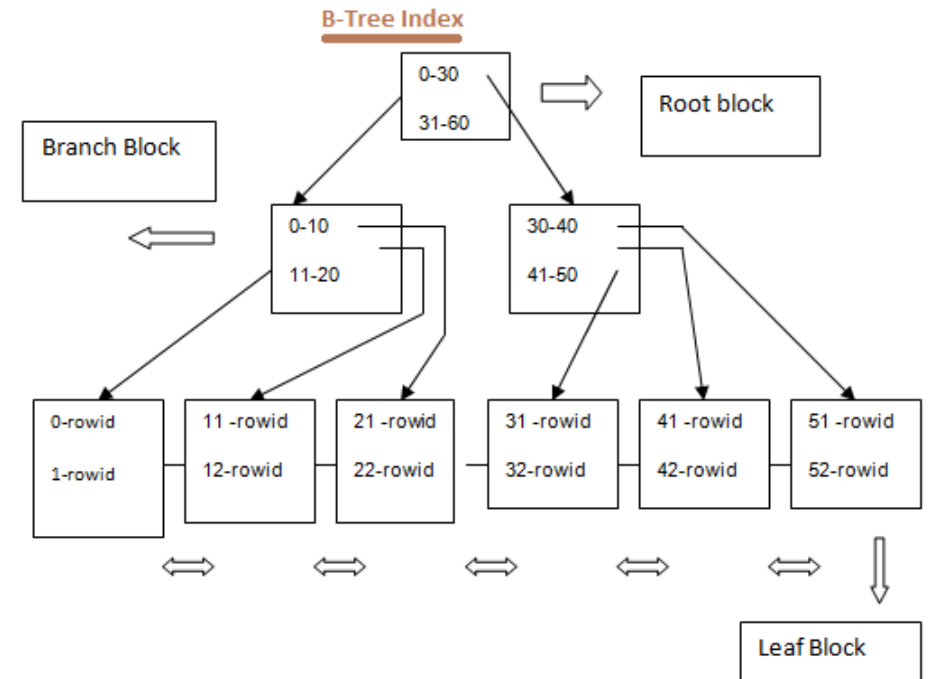


4. Gestion des index

GESTION DES INDEXS

Problème	Action
Fragmentation	REBUILD
Index inutiles	DROP
Mauvais choix	CREATE mieux adapté

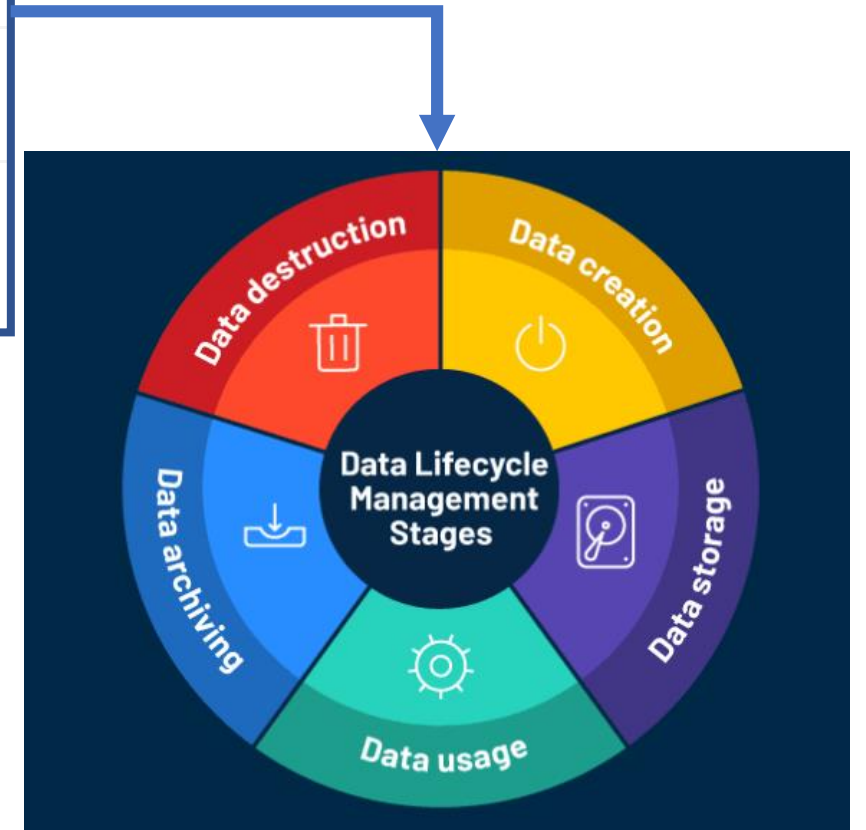
```
ALTER INDEX idx_orders REBUILD;
```



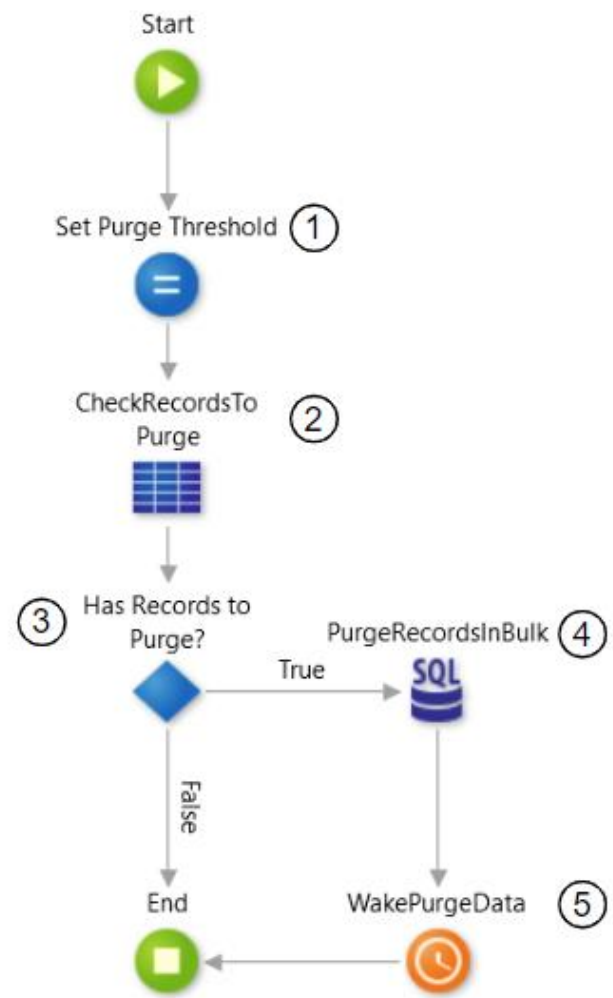
5. Purge & Housekeeping

Purge & Housekeeping

Zone	Nettoyage
AWR	Purge snapshots
Audit	Nettoyage logs
Tables historiques	Archive



Sans purge → croissance infinie → perf dégradée



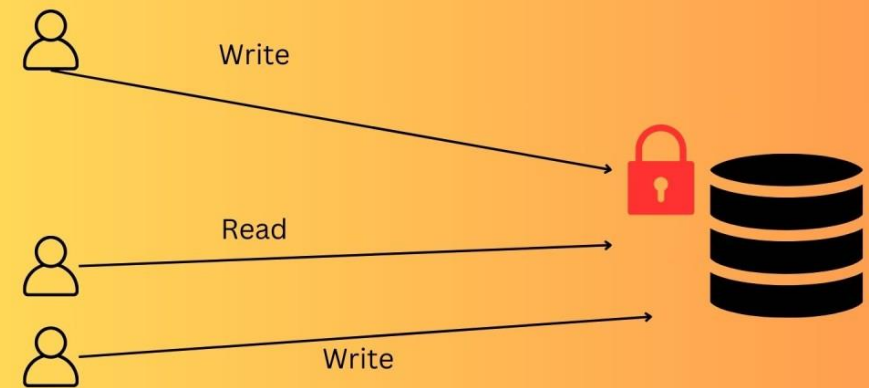
6. Gestion des sessions et verrous

Gestion des sessions et verrous

```
SELECT blocking_session, sid, serial#  
FROM v$session  
WHERE blocking_session IS NOT NULL;
```

“Un verrou non détecté peut paralyser toute l’application.”

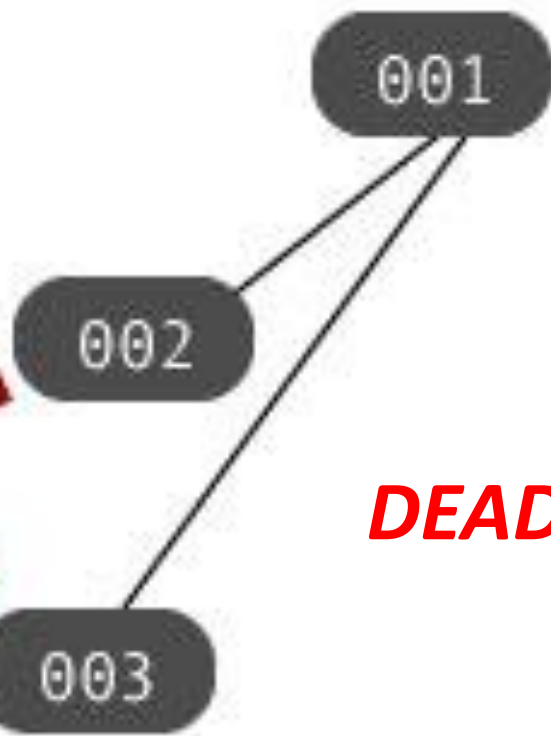
Locking Mechanism for Big Data



Txn A blocked by
Txn B.



Txn B
blocked by Txn A



DEADLOCK ISSUE

Txn A and Txn B are
deadlocked

8. Contrôle des sauvegardes



Contrôle des sauvegardes

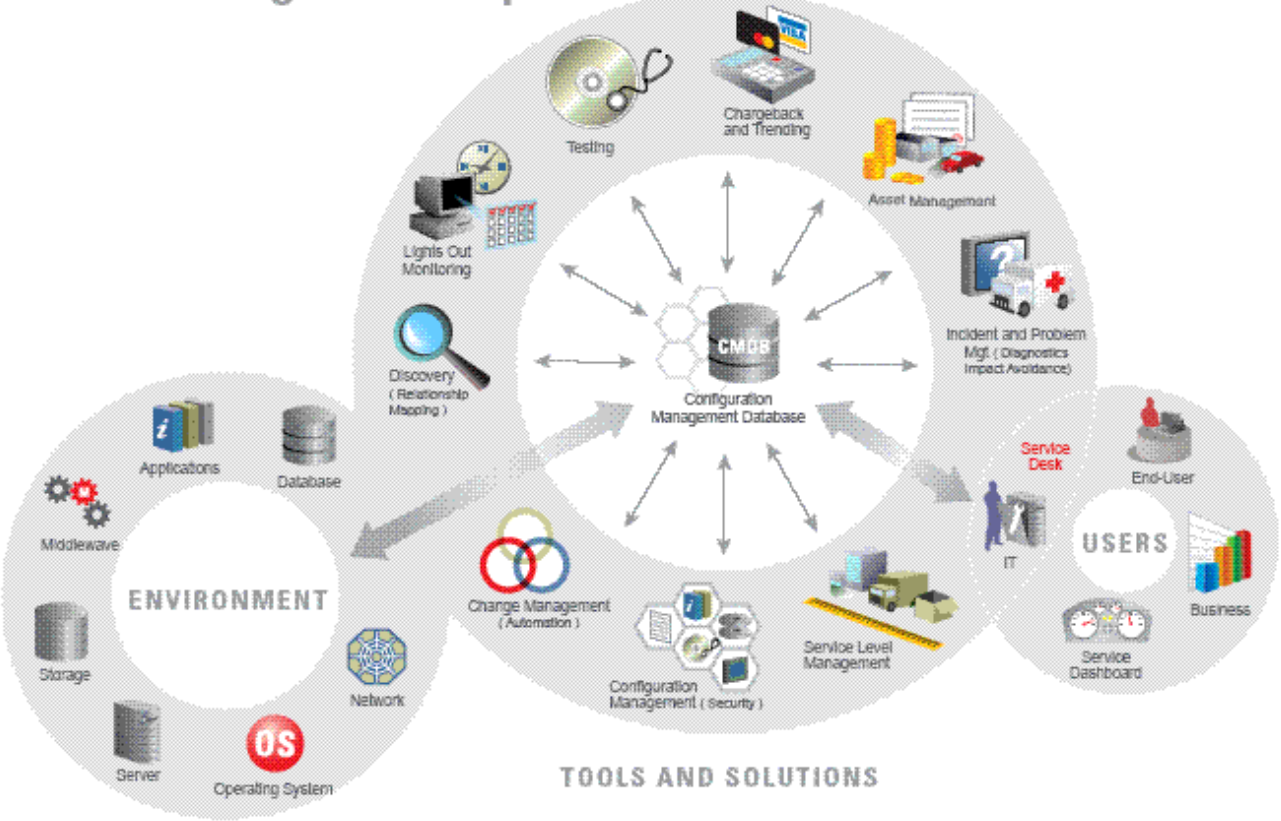
```
LIST BACKUP SUMMARY;
```

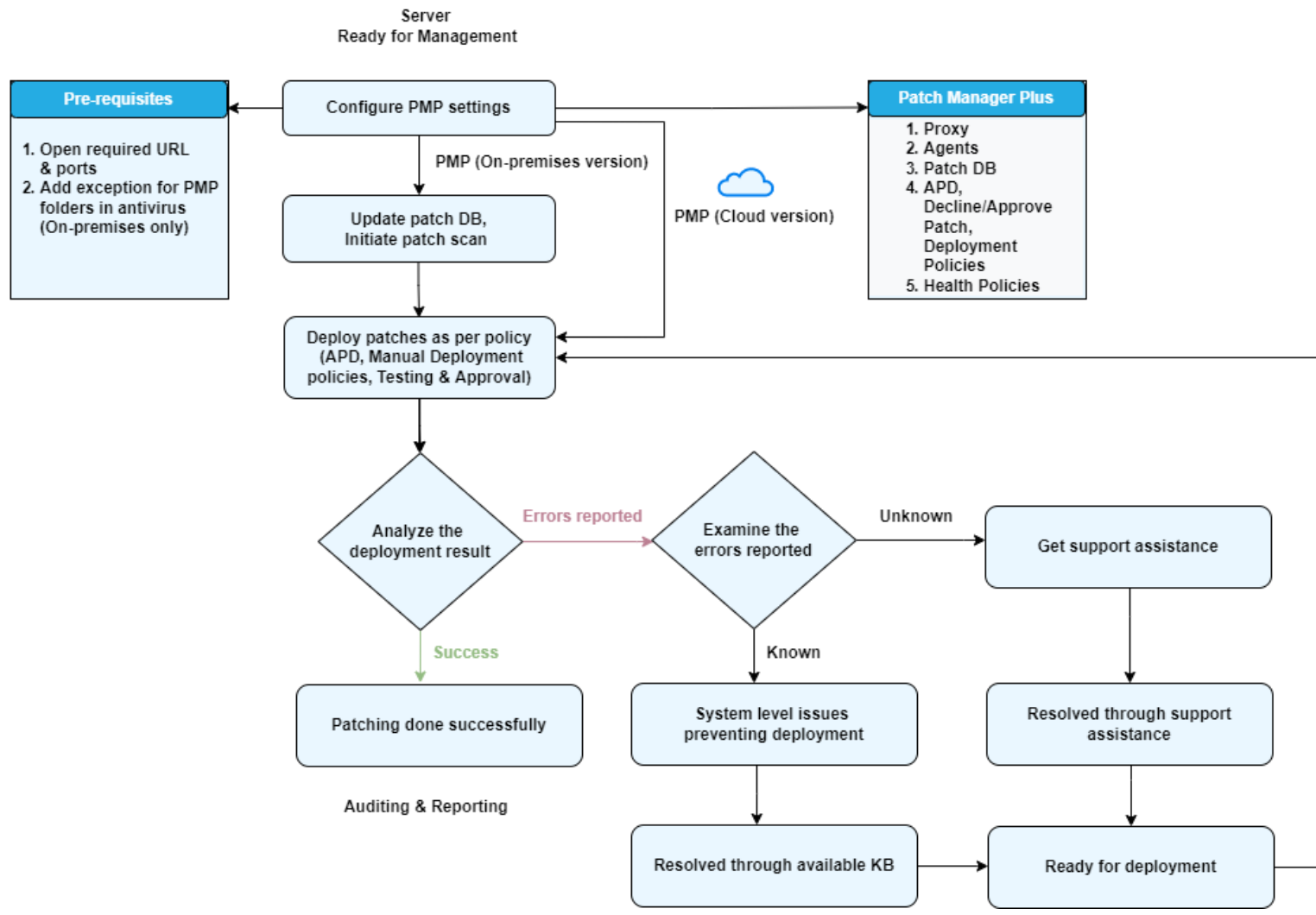
***“Chaque matin, je vérifie
que les backups de la nuit
sont exploitables.”***

9. Patch management (RU/RUR)



Oracle Management Scope





10. Checklist quotidienne DBA



“Le travail invisible du DBA est celui qui garantit que personne ne remarque qu’il y a une base de données derrière l’application.”

Checklist quotidienne DBA

Incident réel évité

Tablespace USERS à 88%

Extension auto OFF

➔ Action préventive

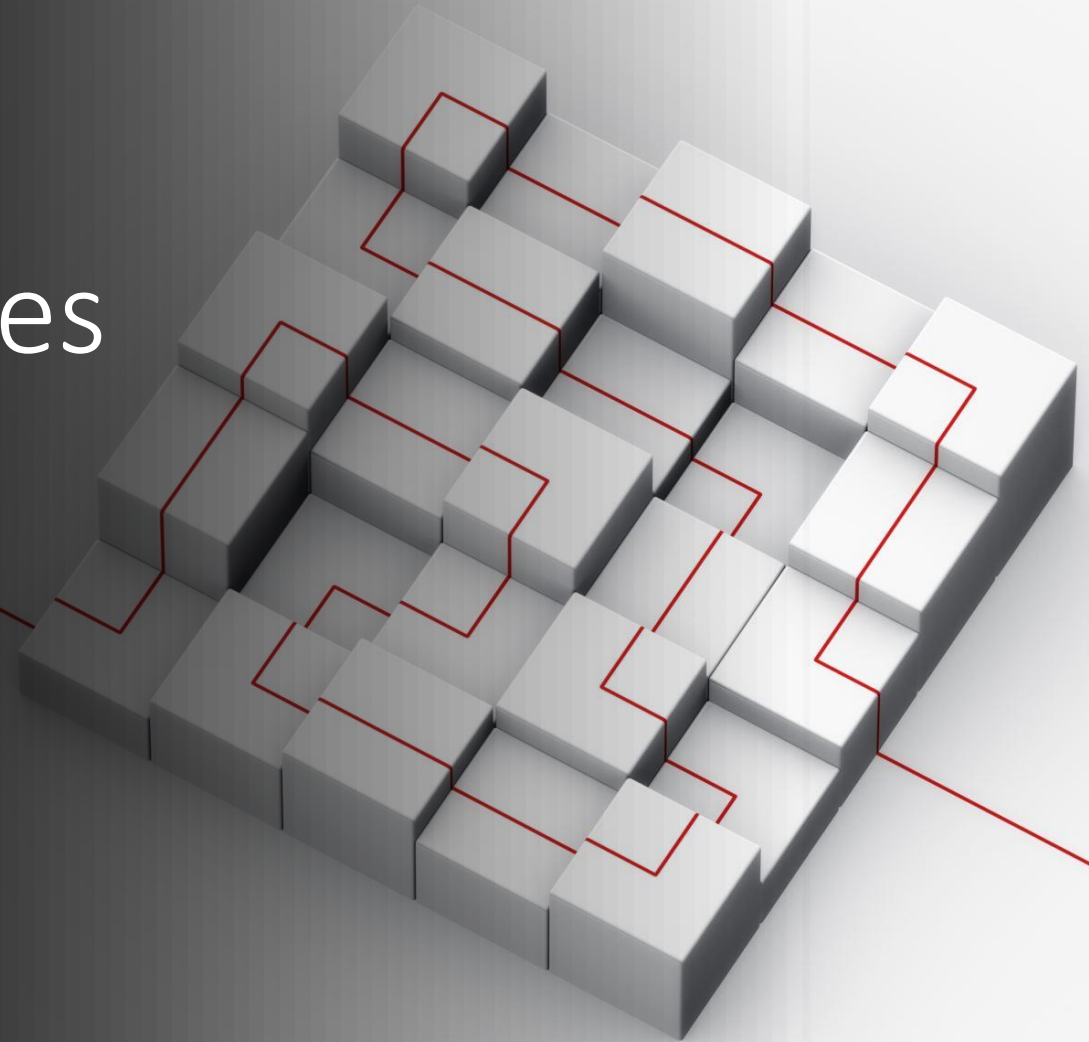
➔ Évite blocage prod à 3h du matin

Tâche	Fréquence
Alert log	Quotidien
Tablespaces	Quotidien
Backups	Quotidien
Sessions bloquées	Quotidien
Stats optimizer	Hebdo
AWR purge	Mensuel



9

Optimizer & Statistiques



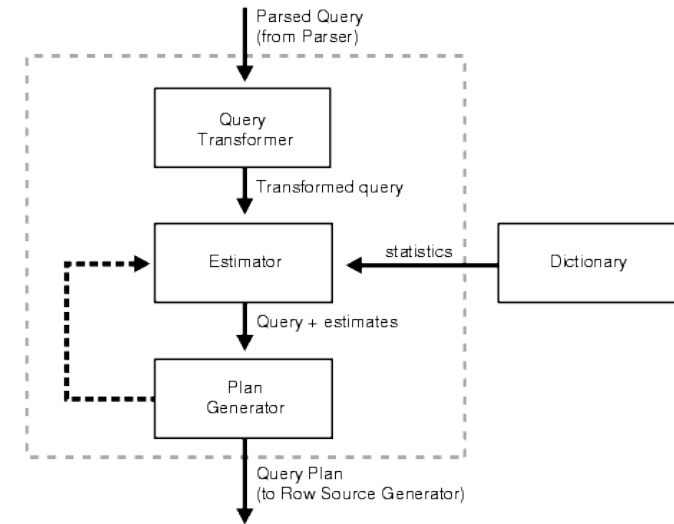
9 – OPTIMIZER & STATISTIQUES ORACLE

- 1. Le CBO — Cost Based Optimizer
- 2. Cardinalité — Le cœur de la décision
- 3. Statistiques objets (Tables & Index)
- 4. Histograms — Quand la distribution n'est pas uniforme
- 5. Dynamic Sampling
- 6. SQL Plan Stability
- 7. Lire les écarts estimé vs réel
- 8. Erreurs classiques Optimizer
- 9. Ce que fait un DBA expert



1. Le CBO — Cost Based Optimizer

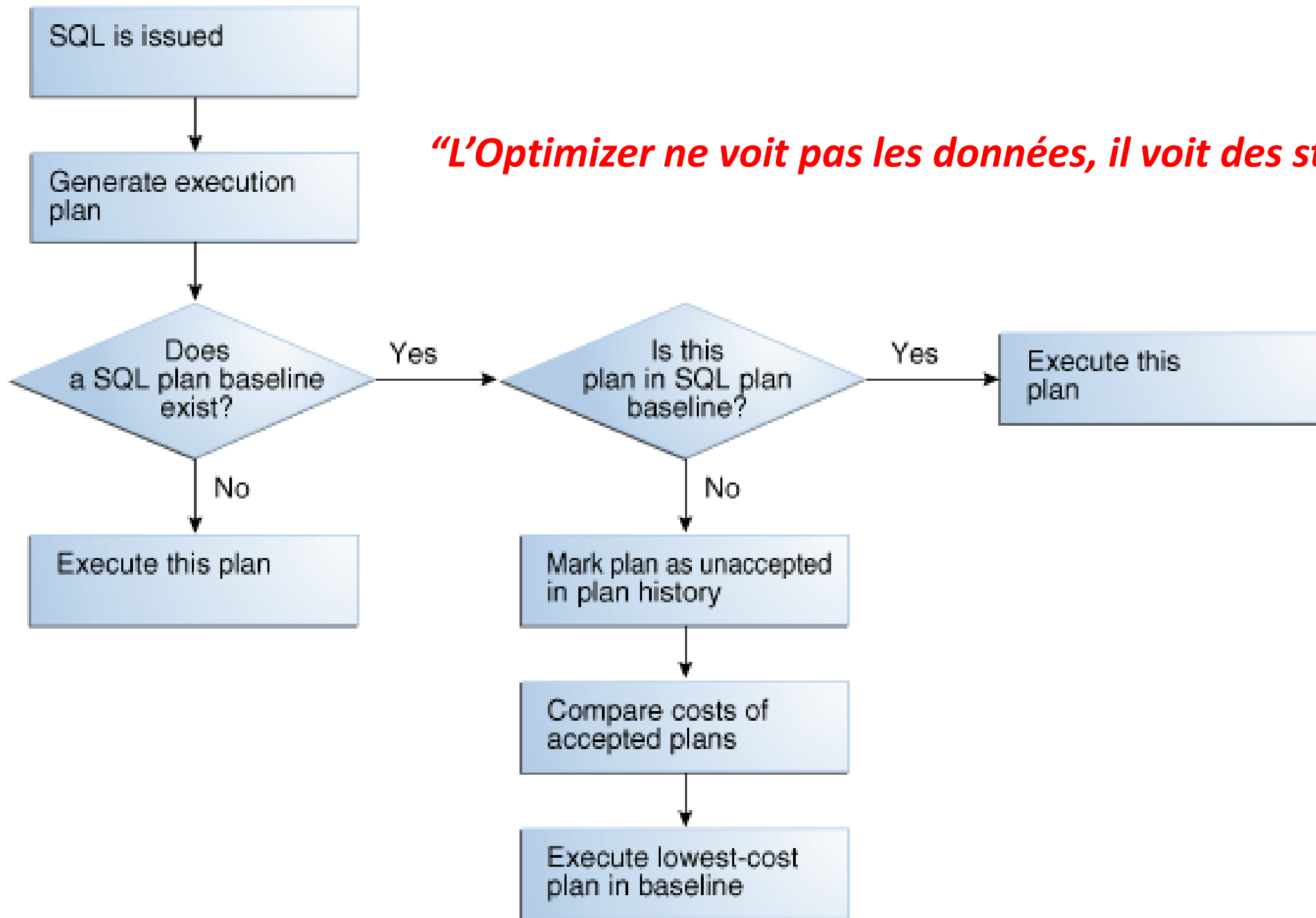
Oracle choisit un plan d'exécution basé sur :



Statistiques objets

Cardinalité estimée

Coût estimé (I/O + CP)



“L’Optimizer ne voit pas les données, il voit des statistiques.”

2. Cardinalité — Le cœur de la décision

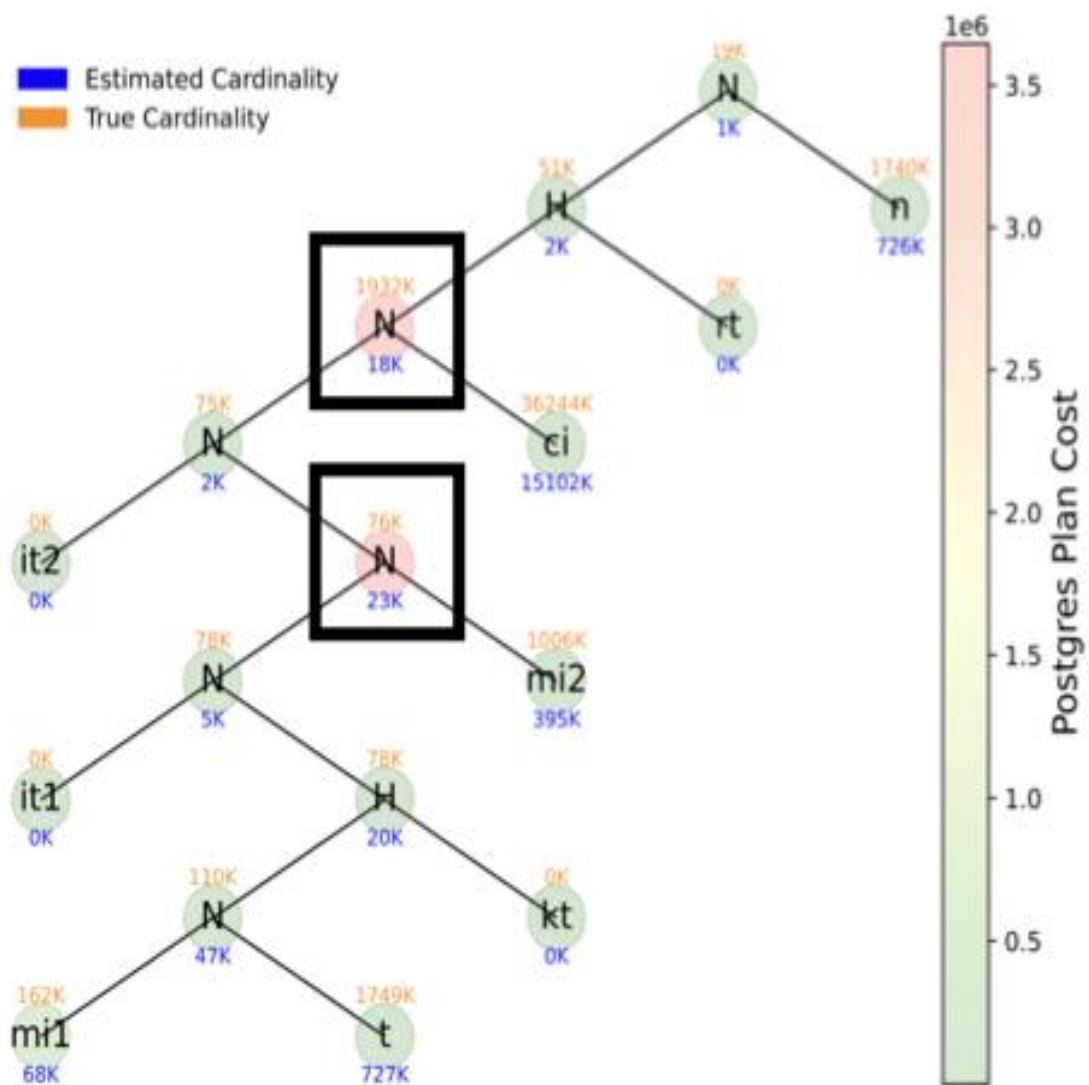


Cardinalité — Le cœur de la décision

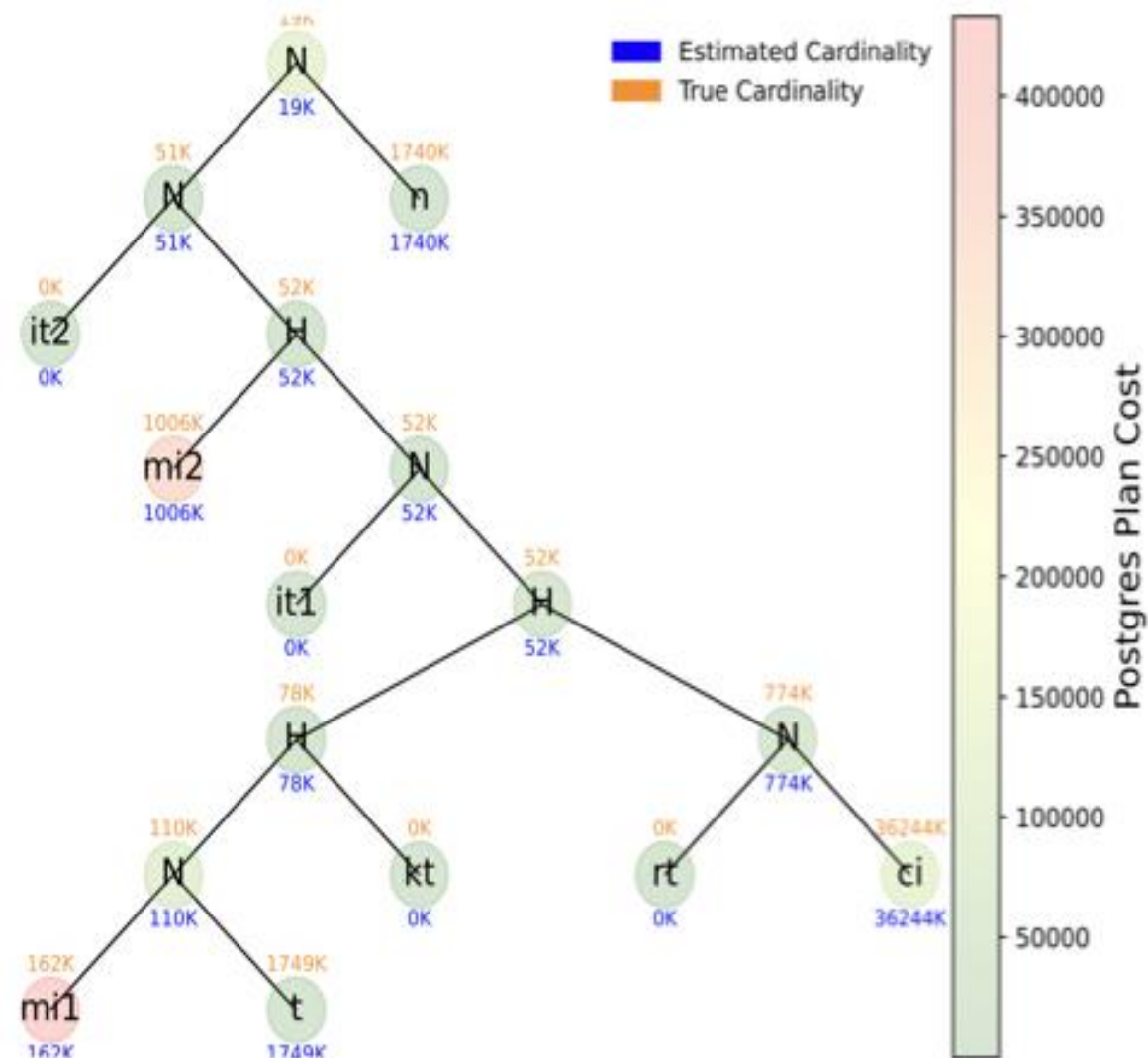
Cardinalité = nombre de lignes estimées à chaque étape du plan.

Mauvaise estimation	Impact
Sous-estimation	Nested loop catastrophique
Sur-estimation	Hash join inutile

🔥 Cas réel :
Estimator : 10 lignes
Réalité : 2 millions
➡ Plan inefficace

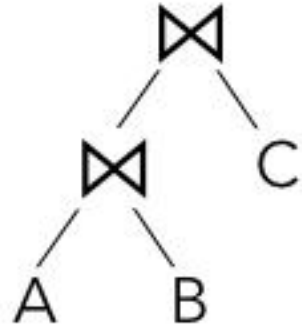
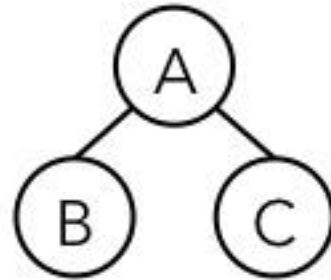


Query Plan based on PostgreSQL estimates. Cost: 7.7e6.

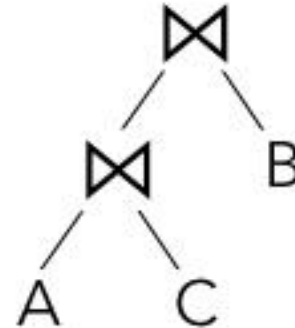


Query Plan based on True estimates. Cost: 1.1e6.

SELECT *
 FROM **A, B, C**
 WHERE **A.b1 = B.b1**
 AND **A.c1 = C.c1**



Plan 1



Plan 2

$$st_1 = (|A| + |B|) + (|A \bowtie B| + |C|)$$

$$Cost_2 = (|A| + |C|) + (|A \bowtie C| + |B|)$$

Assume the cost of a plan is just the sum of the intermediate results. We only need to compare $|A \bowtie B|$ vs $|A \bowtie C|$ to find the best plan. According to true cardinalities, it is Plan 1. Est1 gets the correct answer. But, Est2 corrects estimation of $|A \bowtie C|$, yet chooses Plan 2.

	Estimators	
	TRUE	Est1
$ A \bowtie B $	5	10
$ A \bowtie C $	8	16
Mul-Error	1.0	2.0
Best Plan	Plan 1	Plan 1

3. Statistiques objets (Tables & Index)





Statistiques objets (Tables & Index)

Élément	Rôle
NUM_ROWS	Volume
BLOCKS	Taille
NDV	Valeurs distinctes

```
SELECT table_name, num_rows, blocks  
FROM dba_tables  
WHERE owner='HR';
```

4. Histograms — La Distribution n'est pas uniforme



Histograms — Quand la distribution n'est pas uniforme

Sans histogramme, Oracle suppose une distribution uniforme.

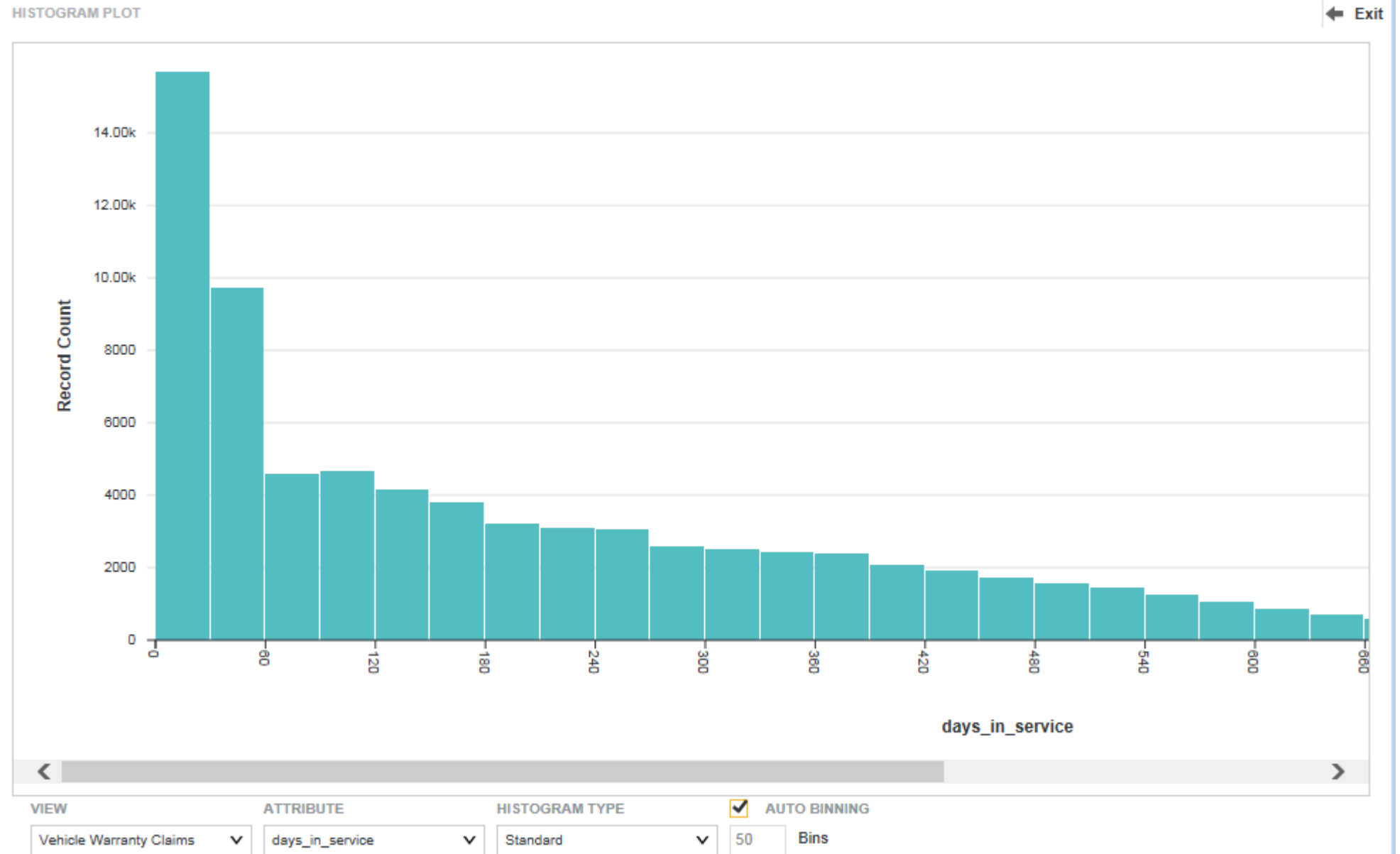
Exemple :

- 99% des lignes = status='ACTIVE'
- 1% = 'CLOSED'

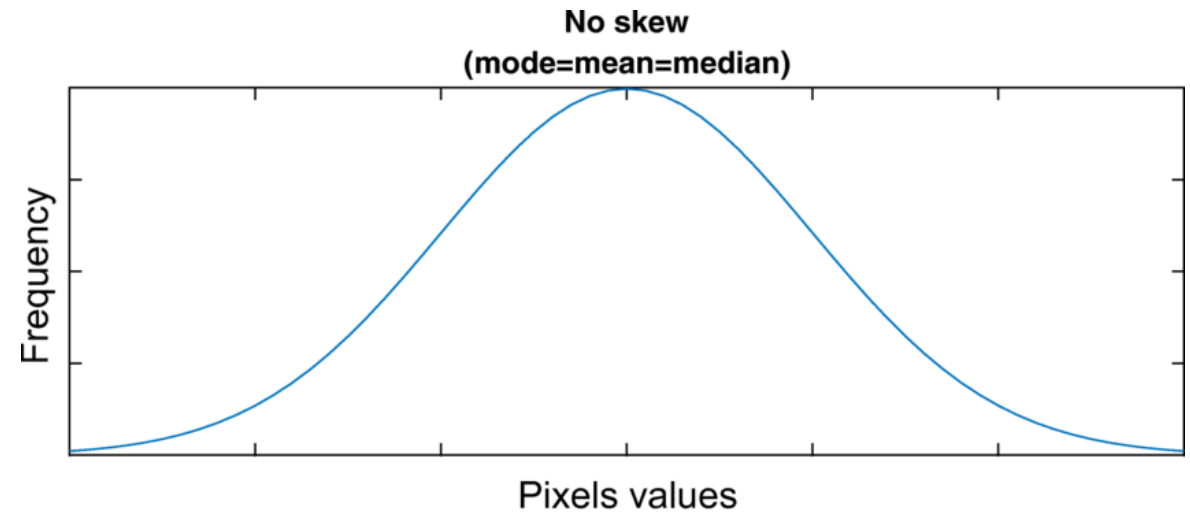
Requête sur `status='CLOSED'` → mauvais plan sans histogramme

```
EXEC DBMS_STATS.GATHER_TABLE_STATS(  
  ownname => 'HR',  
  tabname => 'ORDERS',  
  method_opt => 'FOR COLUMNS status SIZE AUTO');
```

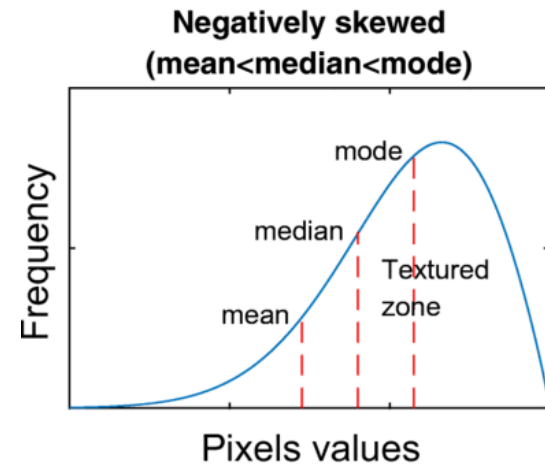
Histogramme de répartition



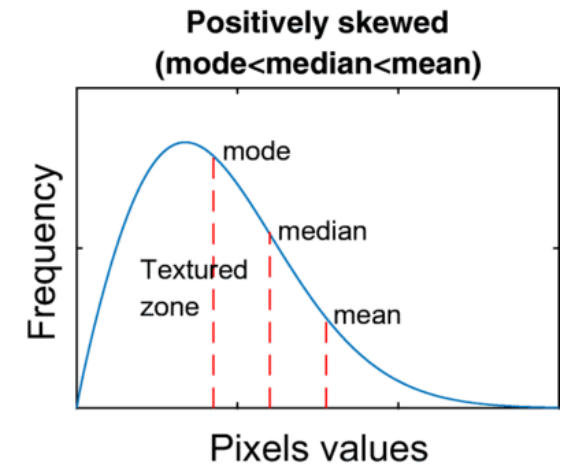
SKew Analysis



(a)



(b)



(c)

5. Dynamic Sampling

```
ALTER SESSION SET optimizer_dynamic_sampling=4;
```

6/7/8. SQL Plan Stability / écarts estimé vs réel





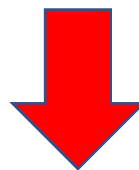
SQL Plan Stability

***“Je stabilise un bon plan,
je ne laisse pas Oracle
improviser en prod.”***

Outil	Rôle
SQL Plan Baseline	Verrouille bon plan
SQL Profile	Ajuste cardinalité
Hints	Forcer plan

Lire les écarts estimé vs réel

```
SELECT * FROM TABLE(DBMS_XPLAN.DISPLAY_CURSOR(NULL, NULL, 'ALLSTATS LAST'));
```



Comparer :

- E-Rows (estimé)
- A-Rows (réel)

Si x1000 d'écart → stats fausses

Problème	Cause
Full scan inattendu	Stats obsolètes
Mauvais index	Mauvaise cardinalité
Plan change après stats	Histogramme absent

Erreurs classiques Optimizer

“Le vrai tuning commence quand on comprend pourquoi l’Optimizer s’est trompé.”

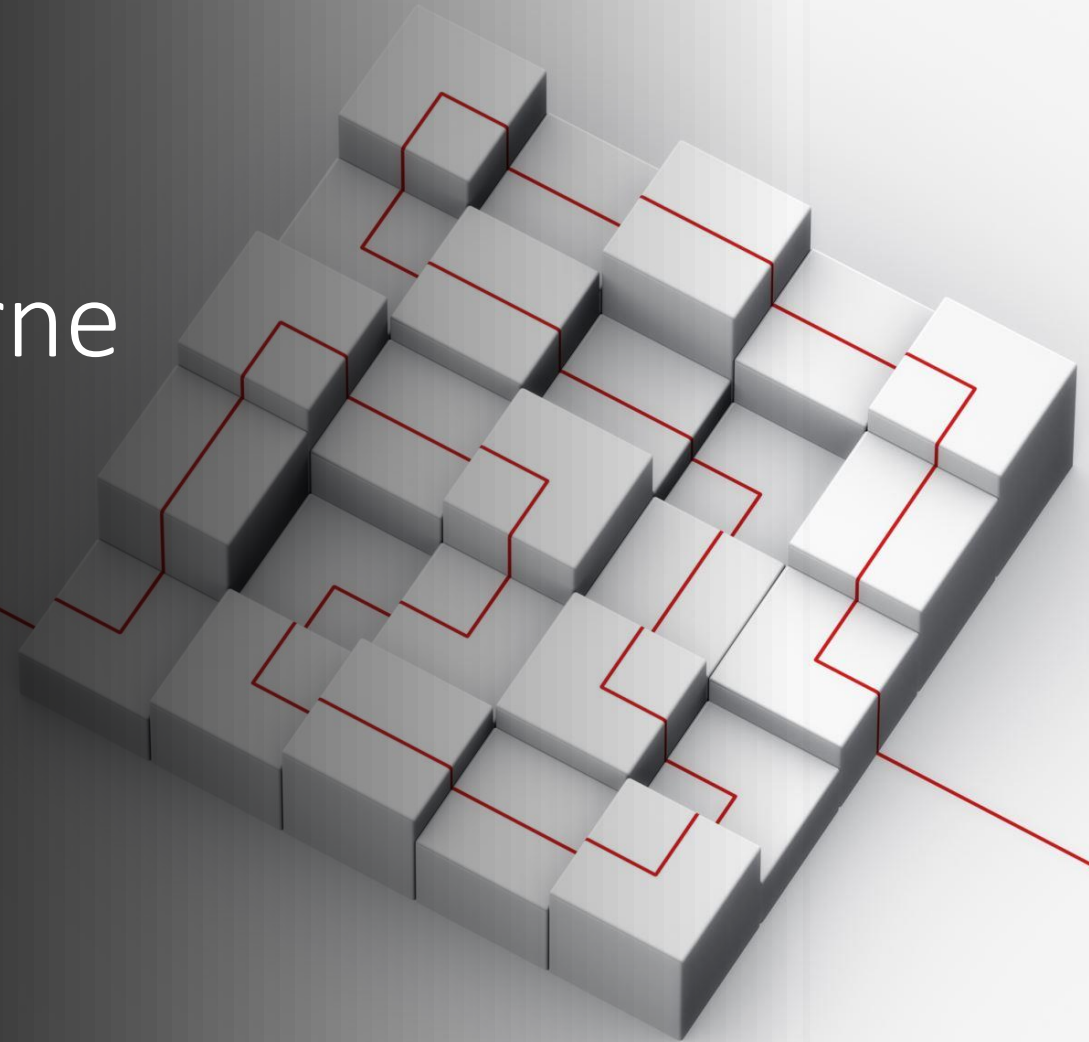
- CBO fonctionnement interne
- Cardinality estimation
- SQL Plan Baselines
- SQL Profiles / Hints (quand et pourquoi)





10

Oracle & le Cloud Moderne



10 – ORACLE & CLOUD / ENVIRONNEMENTS MODERNES

- 1. Oracle ne vit plus seulement On-Prem
- 2. Exadata — L'architecture Oracle ultime
- 3. Oracle Cloud Infrastructure (OCI)
- 4. Autonomous Database
- 5. Lift & Shift vs Refactor
- 6. Sauvegardes & DR dans le Cloud
- 7. Gestion des coûts (Sujet CTO)
- 8. Multi-Cloud & Hybrid



1. Oracle ne vit plus seulement On-Prem

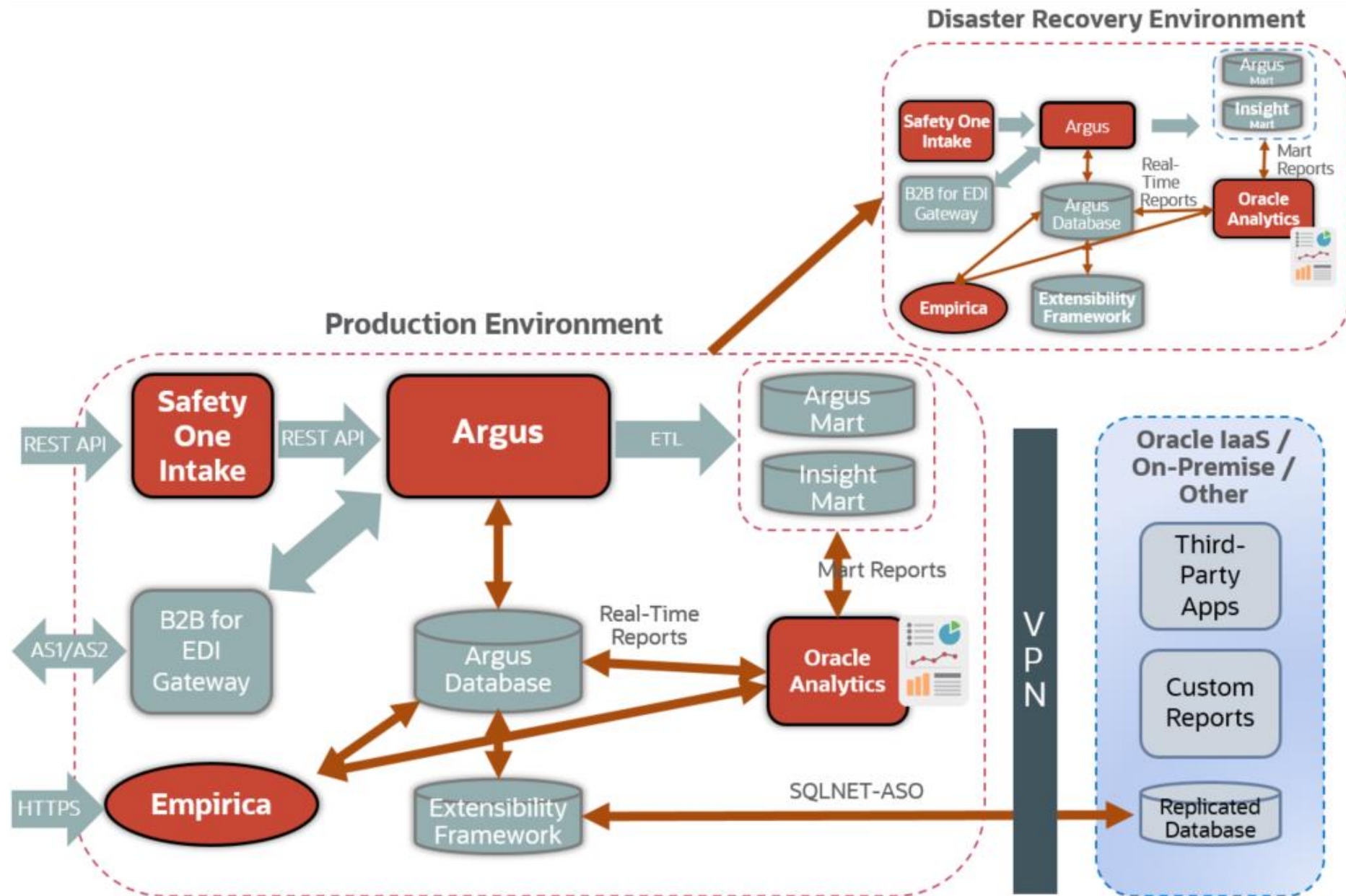


Aujourd'hui Oracle tourne sur :

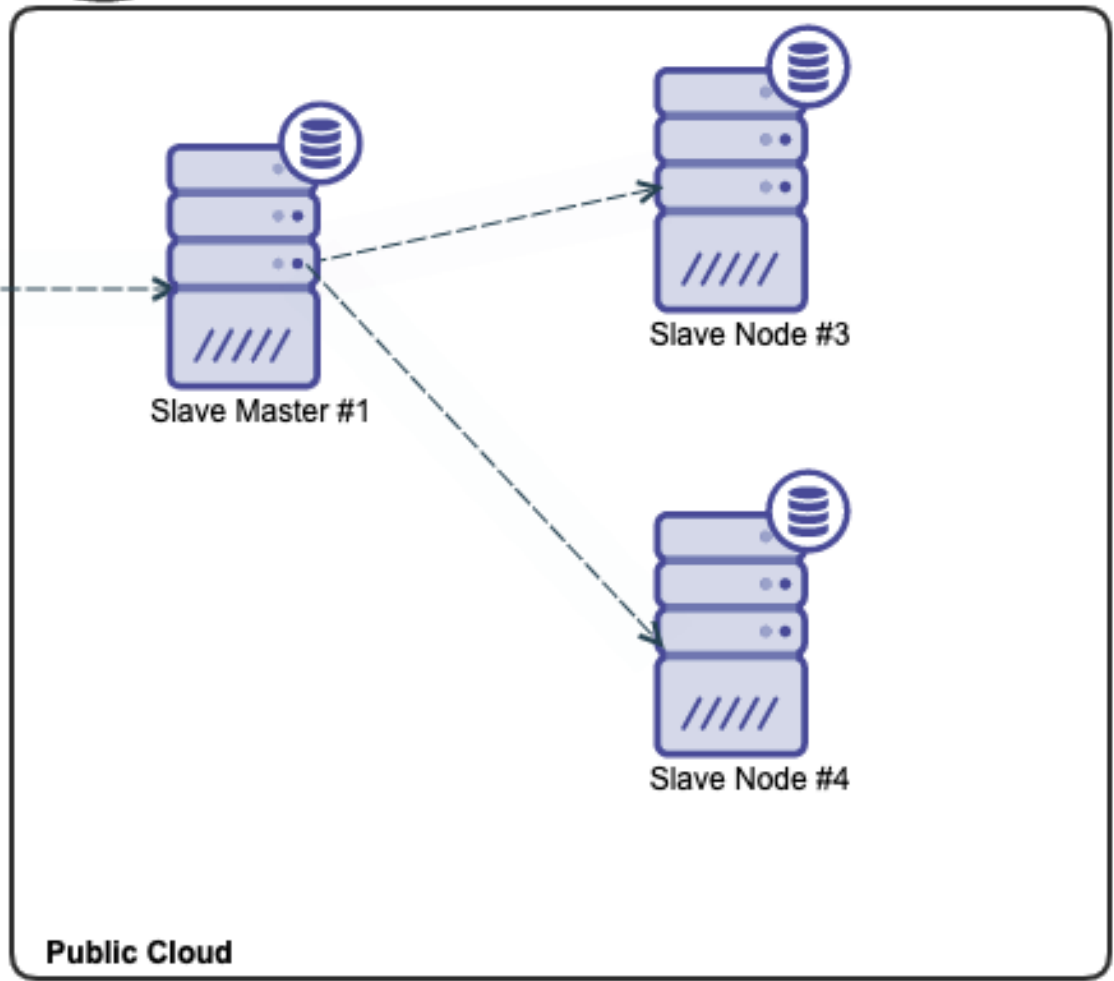
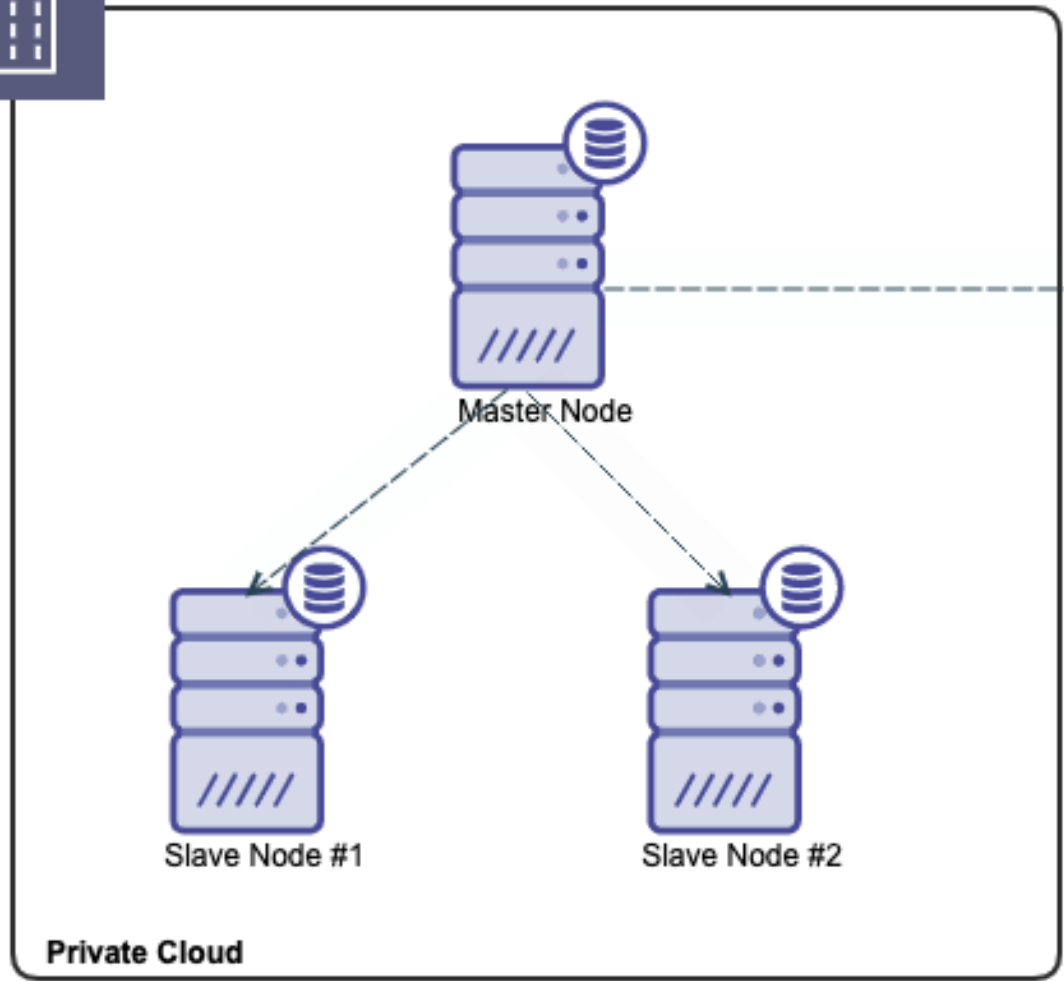
Environnement	Usage
On-Prem	Legacy / contrôle total
OCI	Performances optimisées
AWS/Azure	Intégration SI
Hybride	Transition progressive

“Le DBA moderne doit savoir gérer des bases distribuées entre plusieurs environnements.”

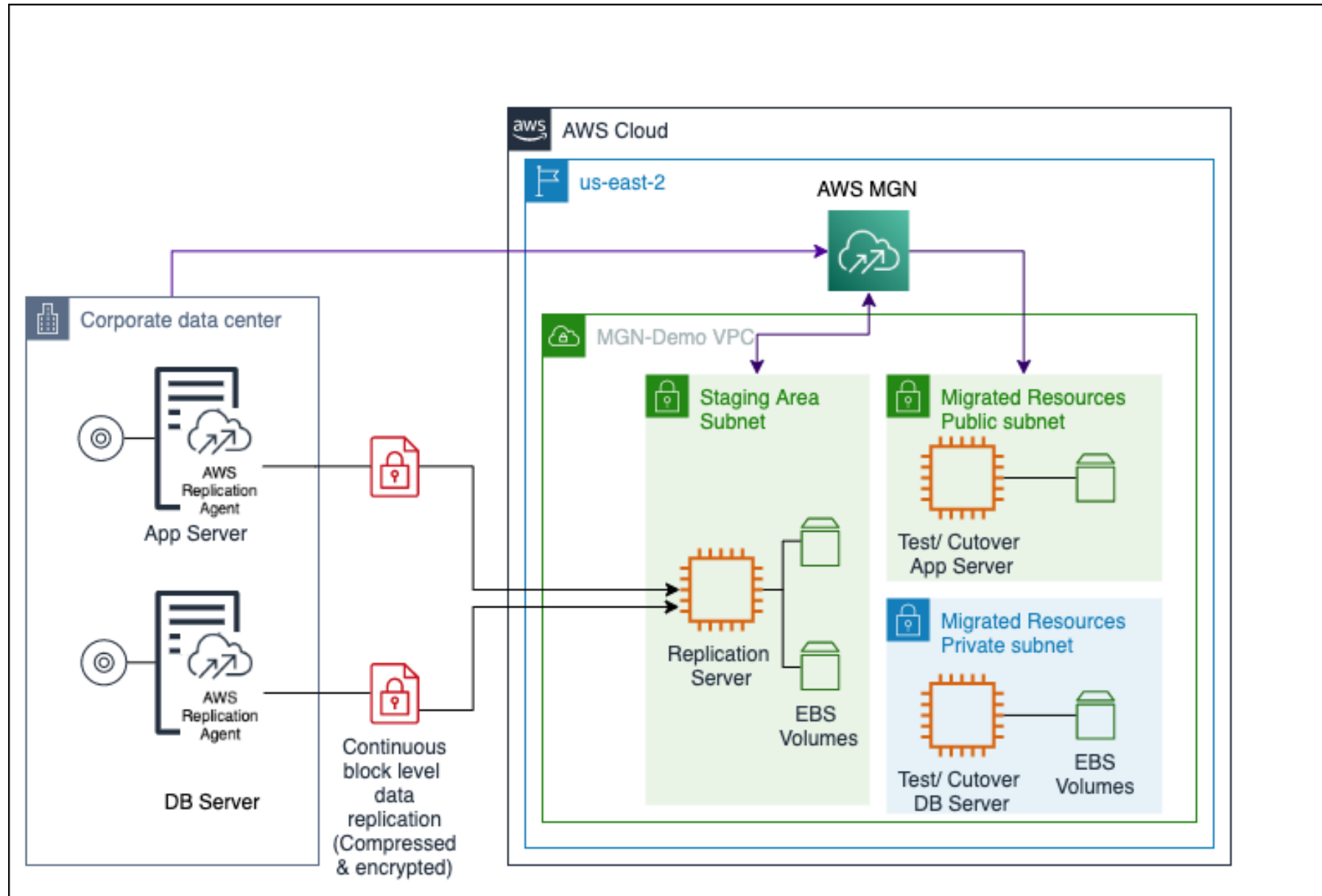
Disaster Recovery with Oracle



AWS RECOVERY SOLUTION



DATABASES REPLICATION WITH AWS



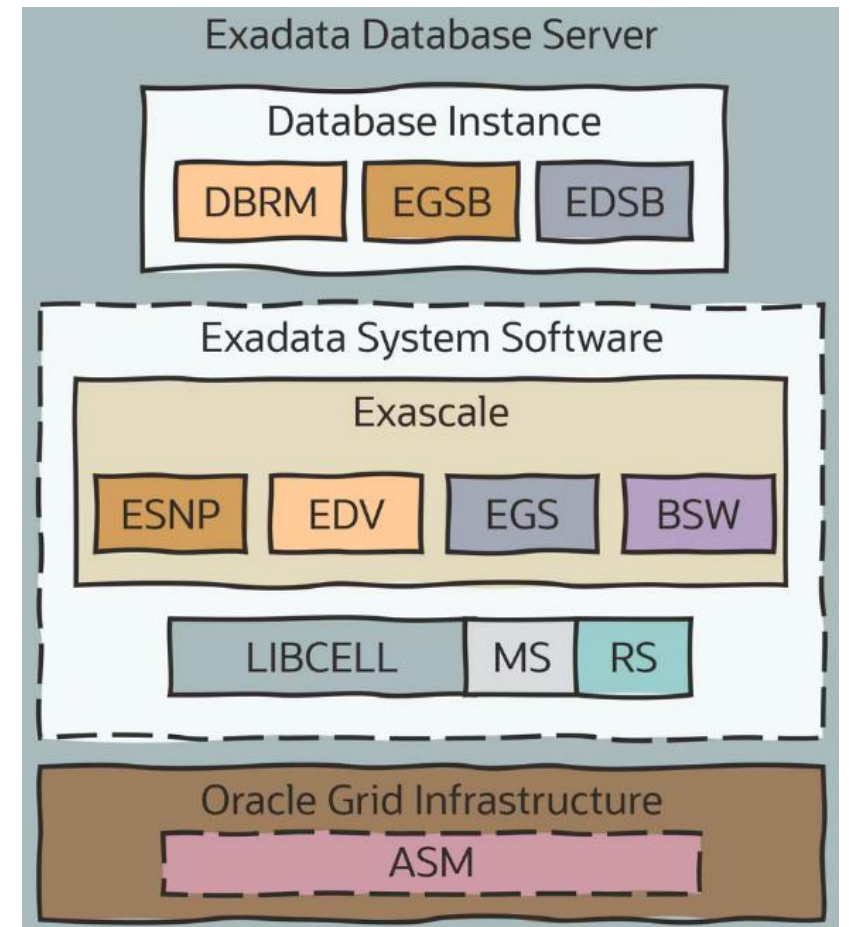
2. Exadata — L'architecture Oracle ultime



Exadata = matériel + logiciel optimisé Oracle

Fonction	Gain
Smart Scan	Filtrage côté stockage
Storage Index	Moins d'I/O
Hybrid Columnar Compression	Stockage réduit

“Sur Exadata, on déplace le traitement vers le stockage.”

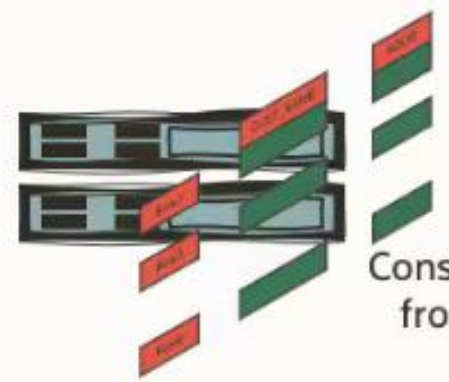


```
1
select CUSTOMER_NAME, ADDRESS
from SALES_ORDERS
where REGION = 'NORTH AMERICA'
and TOTAL_ORDER_AMOUNT >= 500;
```

	CUST_NAME	ADDR
Row 1		
Row 2		
Row 3		

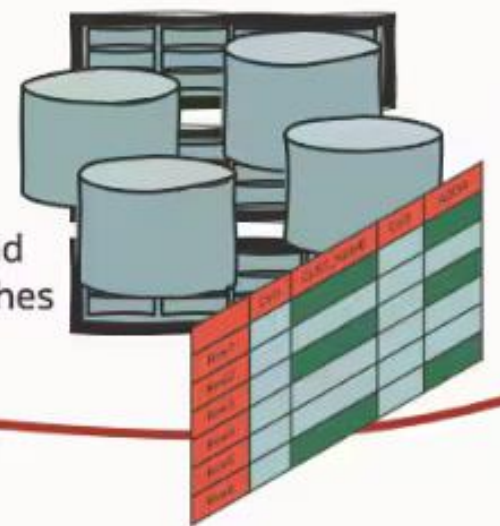
6
3 rows returned

2
Smart Scan constructed and metadata sent to Storage Servers

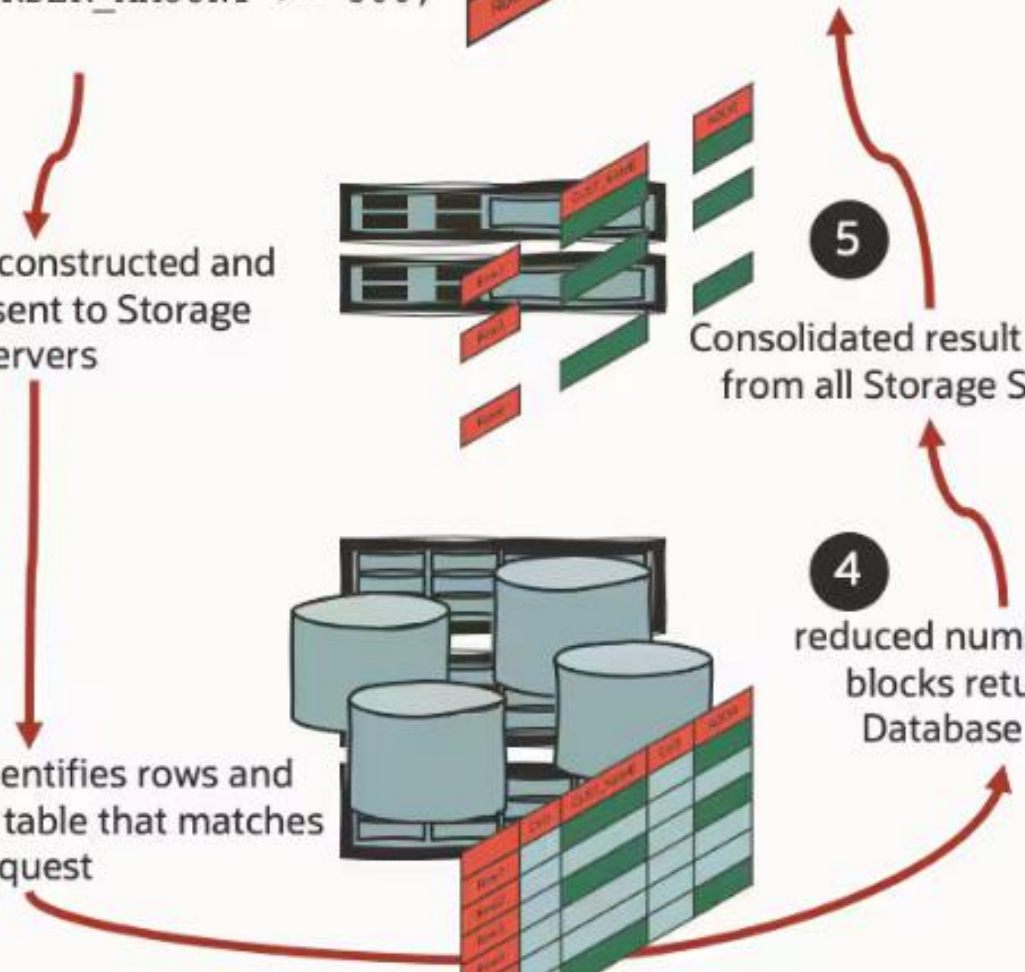


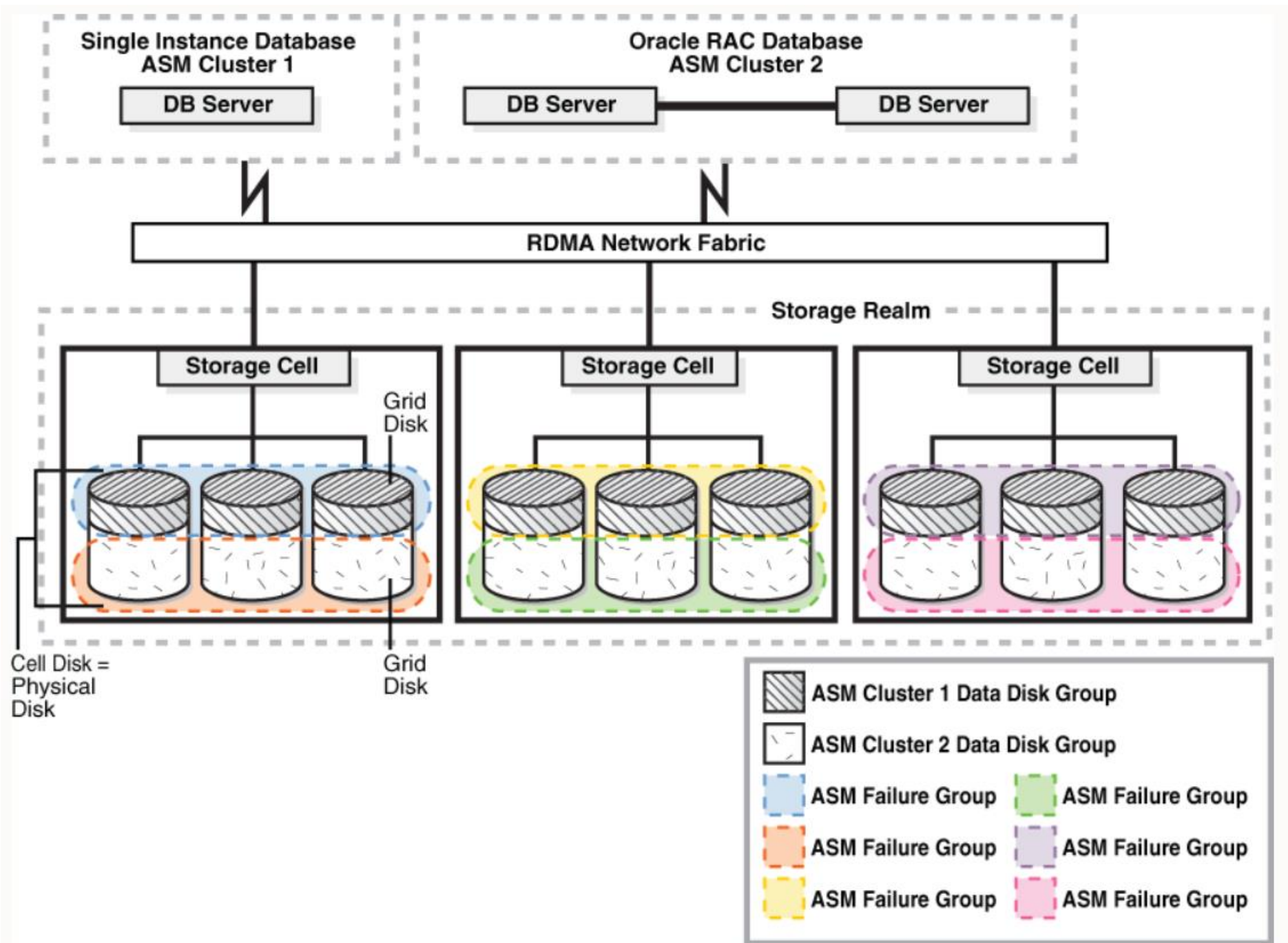
5
Consolidated result set built from all Storage Servers

3
Smart Scan identifies rows and columns within table that matches request



4
reduced number of data blocks returned to Database Server





3. Oracle Cloud Infrastructure (OCI)



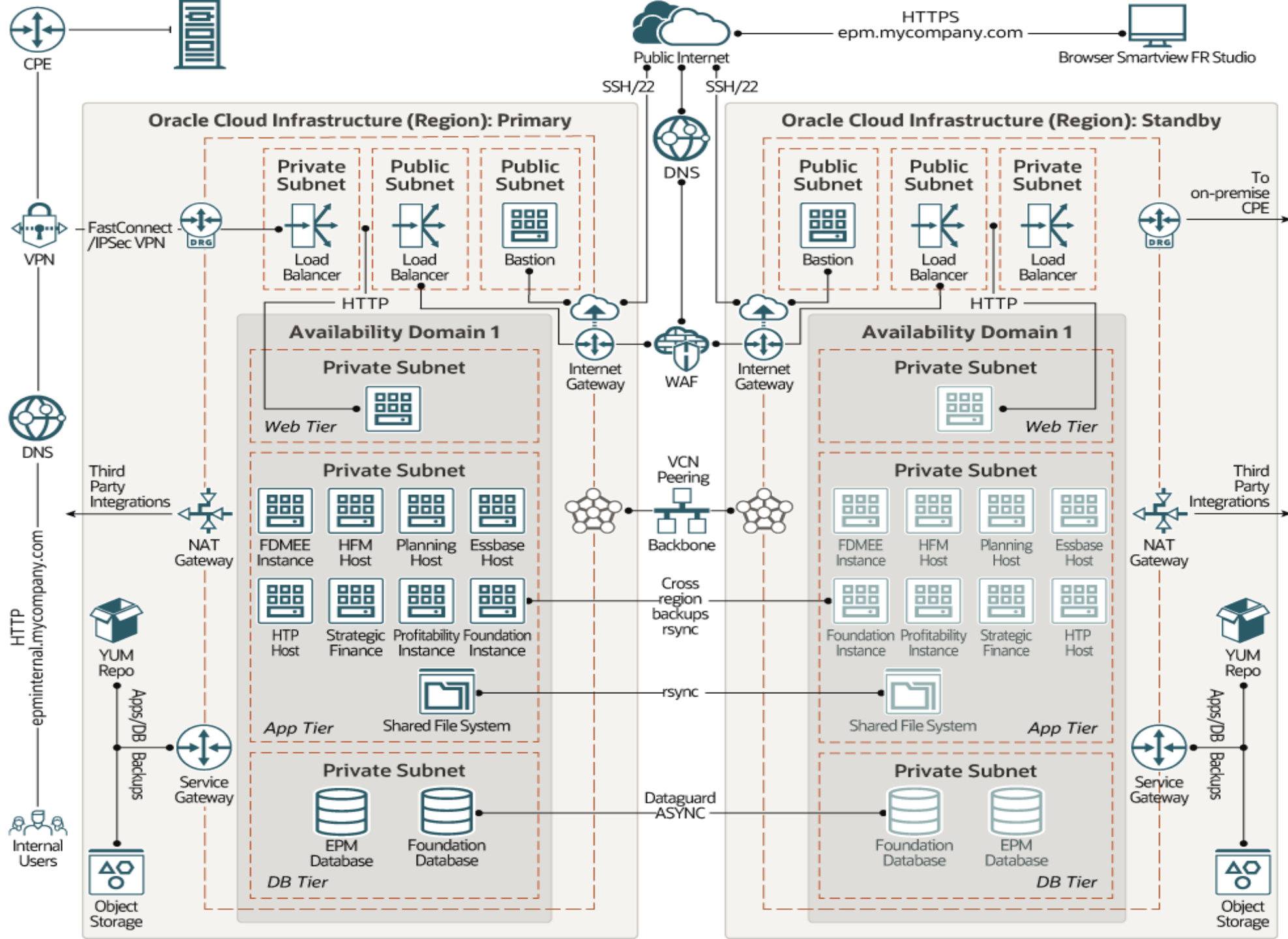
OCI ARCHITECTURE

OCI propose :

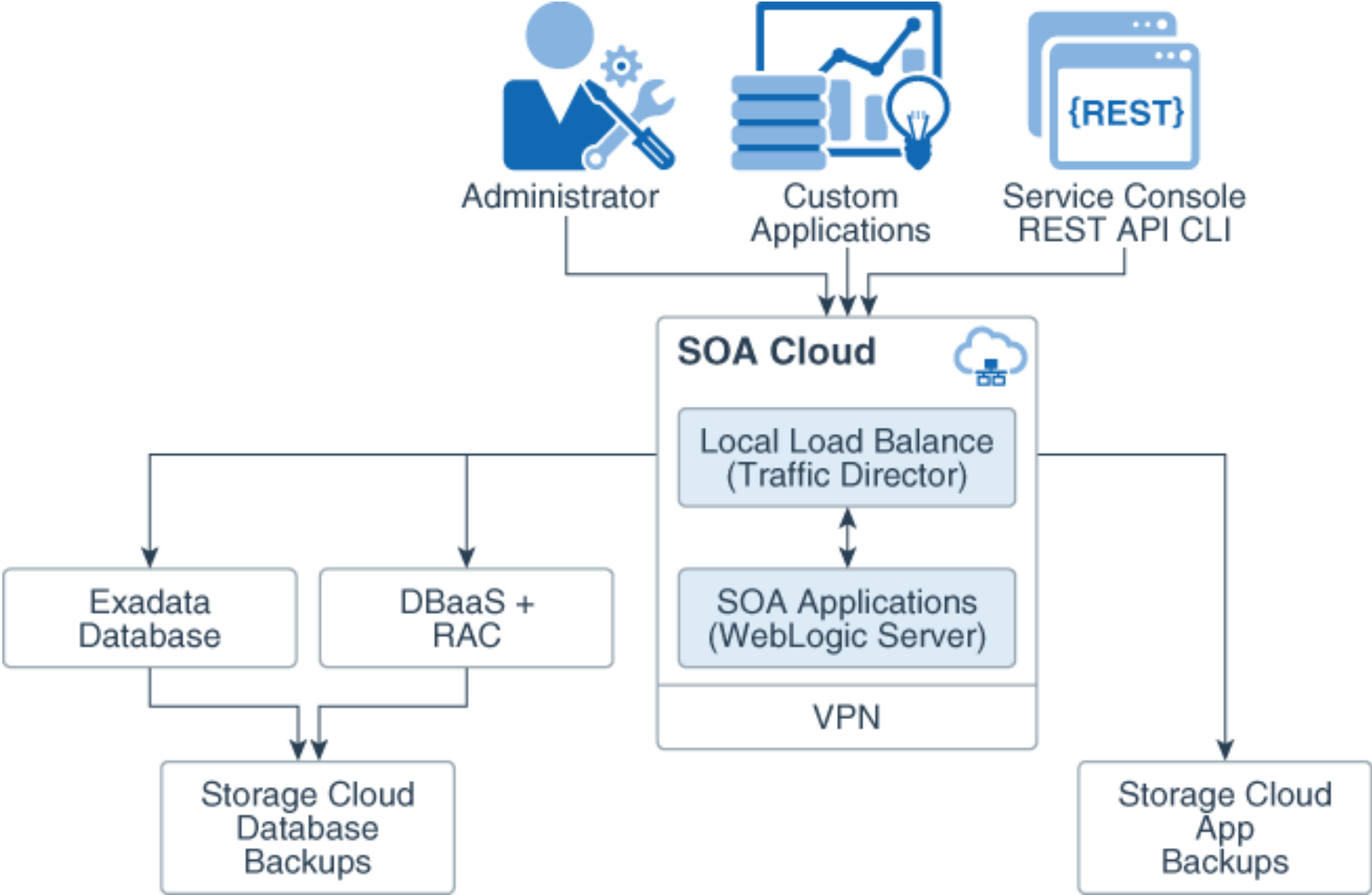
- VM DB Systems
- Bare Metal DB
- Exadata Cloud
- Autonomous DB

Avantages :

- Latence optimisée Oracle
- Backup cloud natif
- Réseau haute perf



SOA CLOUD



4. Autonomous Database





Autonomous Database

Oracle gère :

- ✓ Patch
- ✓ Backup
- ✓ Tuning automatique
- ✓ Scaling CPU

Mais...

Ce que fait Oracle

Infra

Paramètres

Patching

Ce que fait encore le DBA

Modèle données

Architecture SQL

Gouvernance & coûts

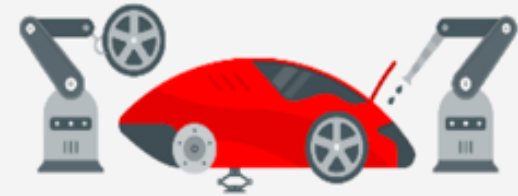
Autonomous Vision: Effortless, Limitless, Unbreakable Data Cloud



Self-Provisioning



Self-Securing



Self-Managing



Self-Repairing



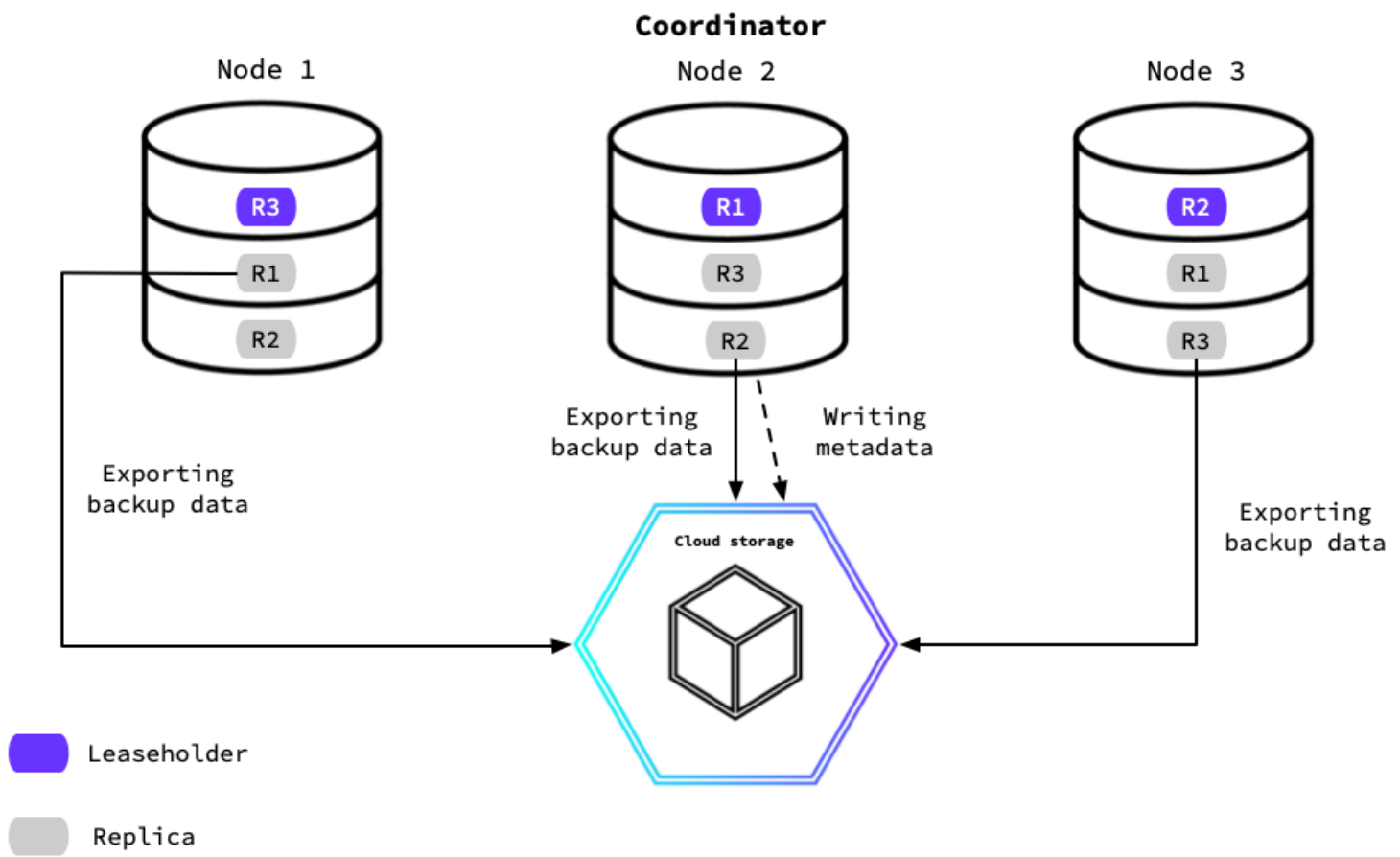
Self-Scaling



Self-Optimizing

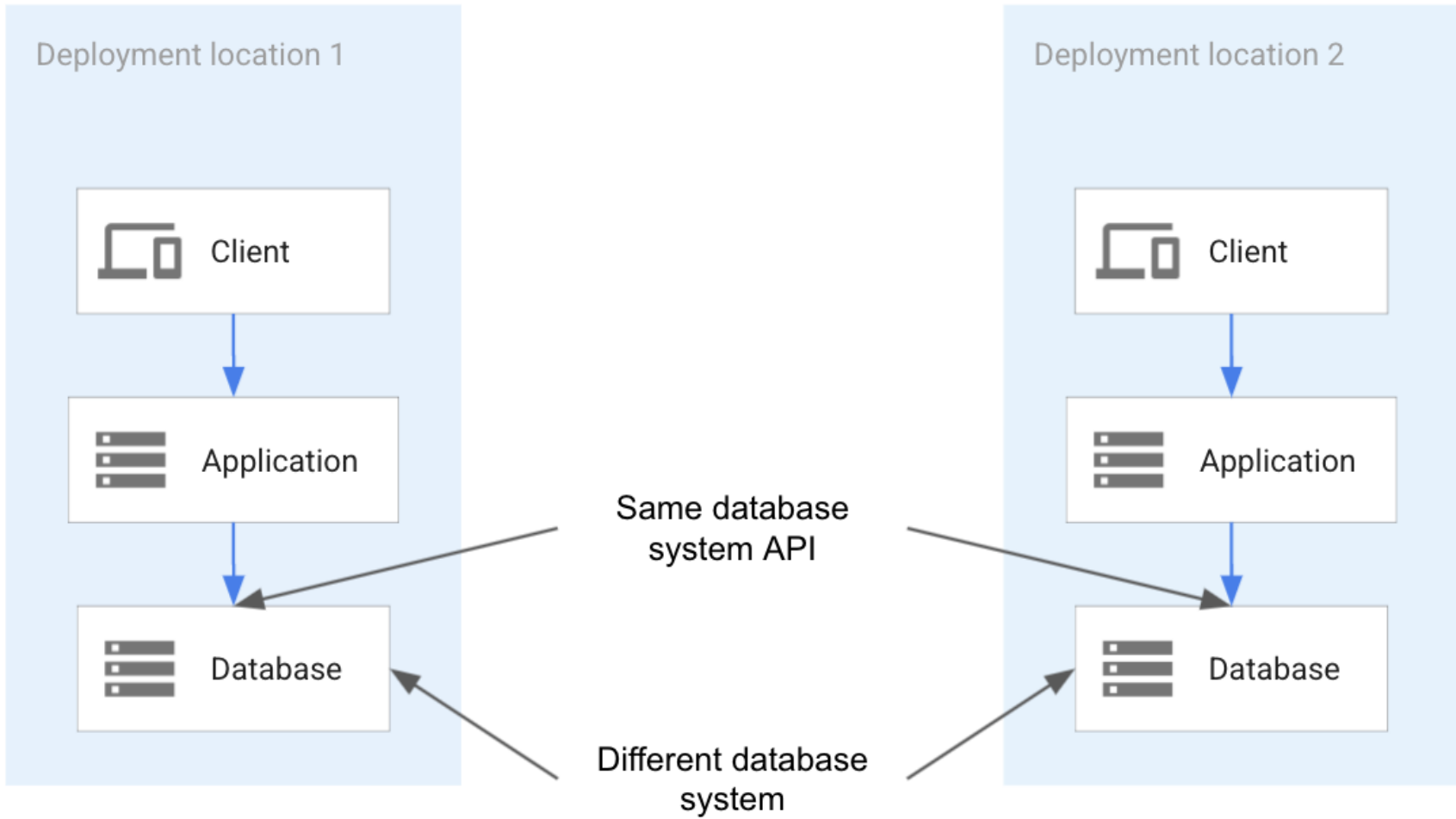
6. Sauvegardes & DR dans le Cloud





8. Multi-Cloud & Hybrid





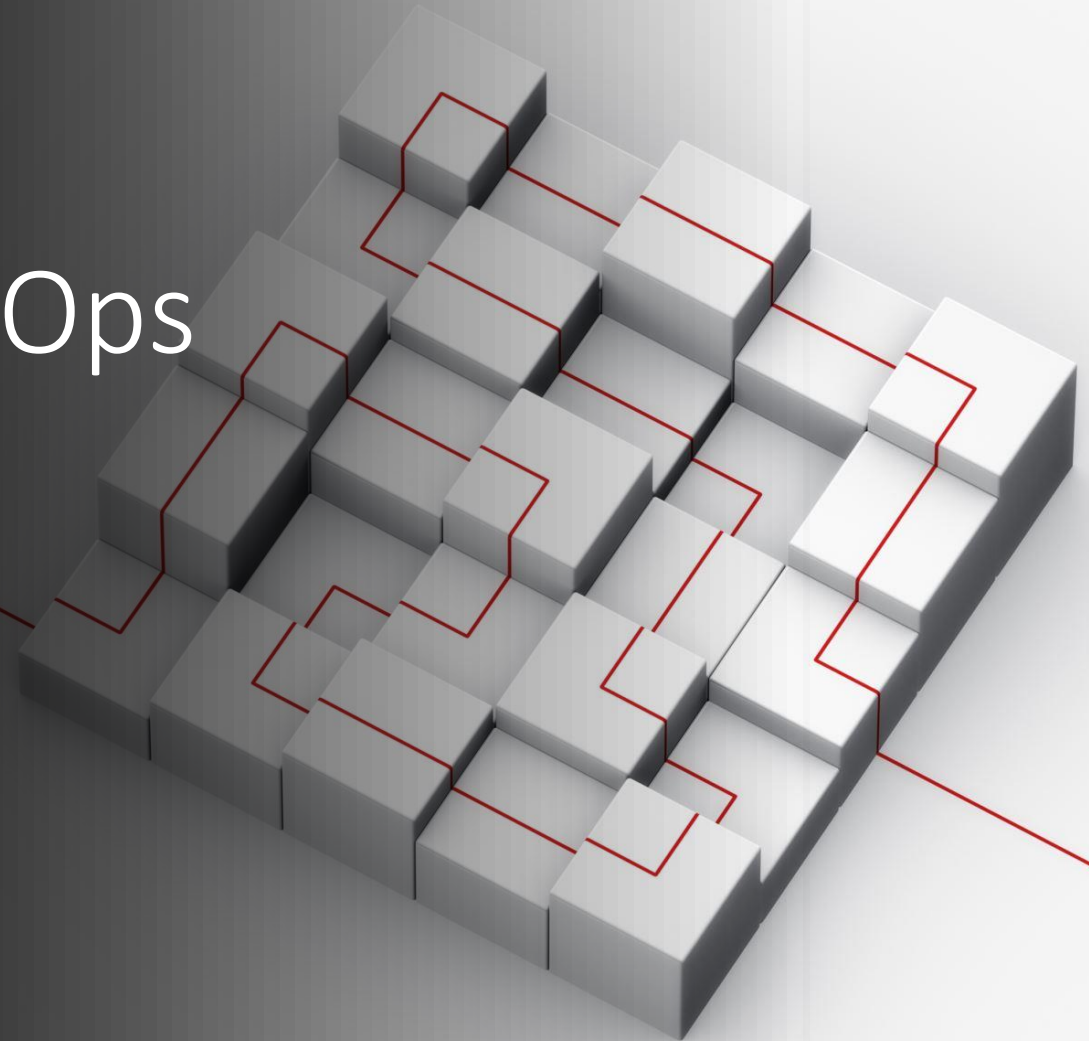
- Autonomous Database (vision critique)
- Exadata vs Cloud
- Lift & Shift vs Refactor
- Backup cloud / Object storage
- Coûts & optimisation





11

Automatisation & DevOps



11 – AUTOMATISATION & DEVOPS POUR DBA ORACLE

- 1. Pourquoi l'automatisation est devenue essentielle
- 2. Scripts DBA (Shell / Python)
- 3. Ansible pour Oracle
- 4. Infrastructure as Code (IaC)
- 5. CI/CD pour bases de données
- 6. Gestion des changements DB
- 7. Automatisation des tâches DBA
- 8. Surveillance automatisée + Remédiation



1. Pourquoi l'automatisation est devenue essentielle



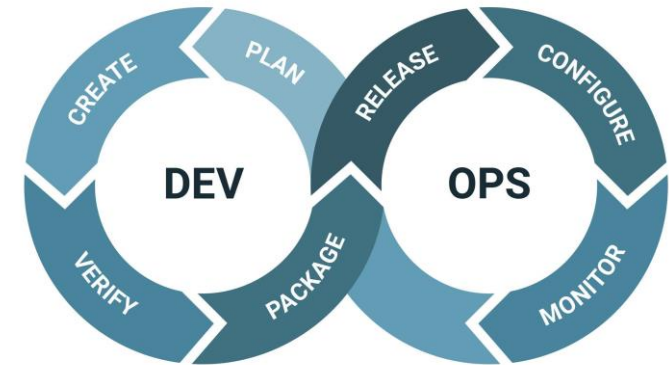
Pourquoi
l'automatisation
est devenue
essentielle

Avant :

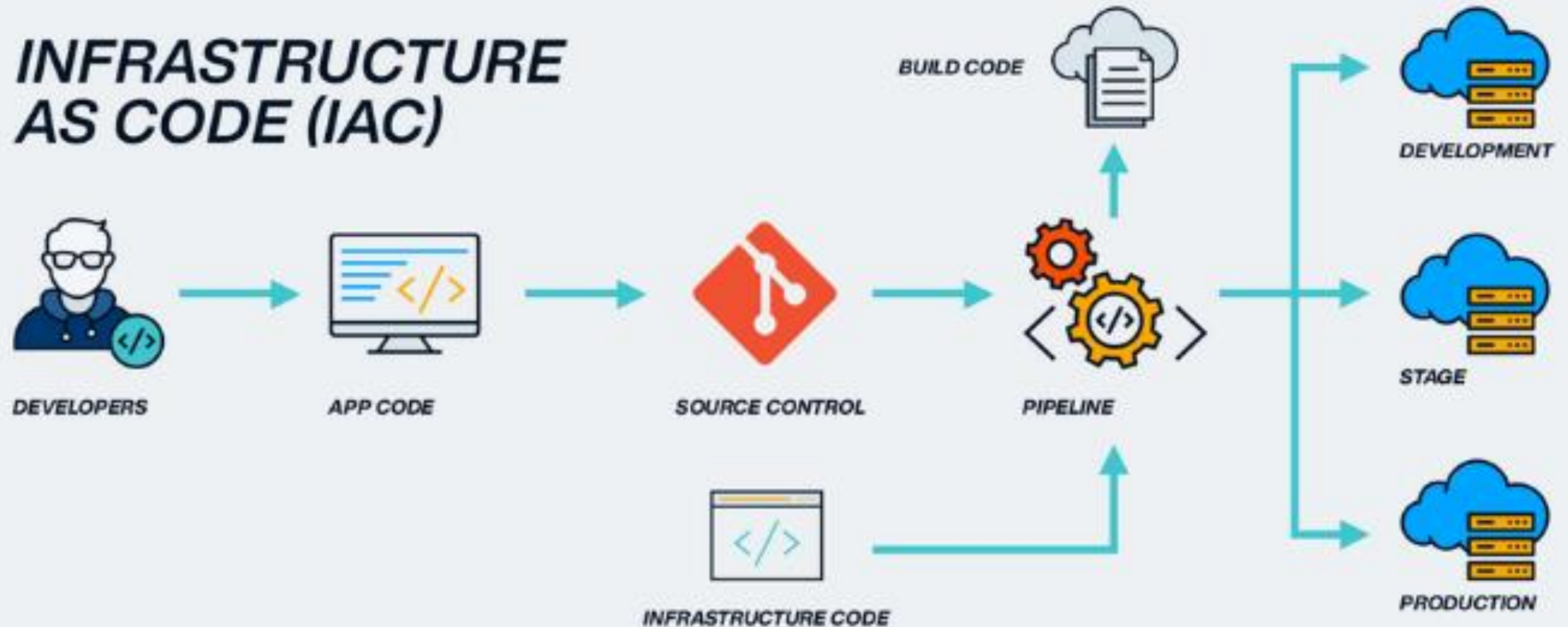
- ✗ Procédures manuelles
- ✗ Risque d'erreur
- ✗ Temps long

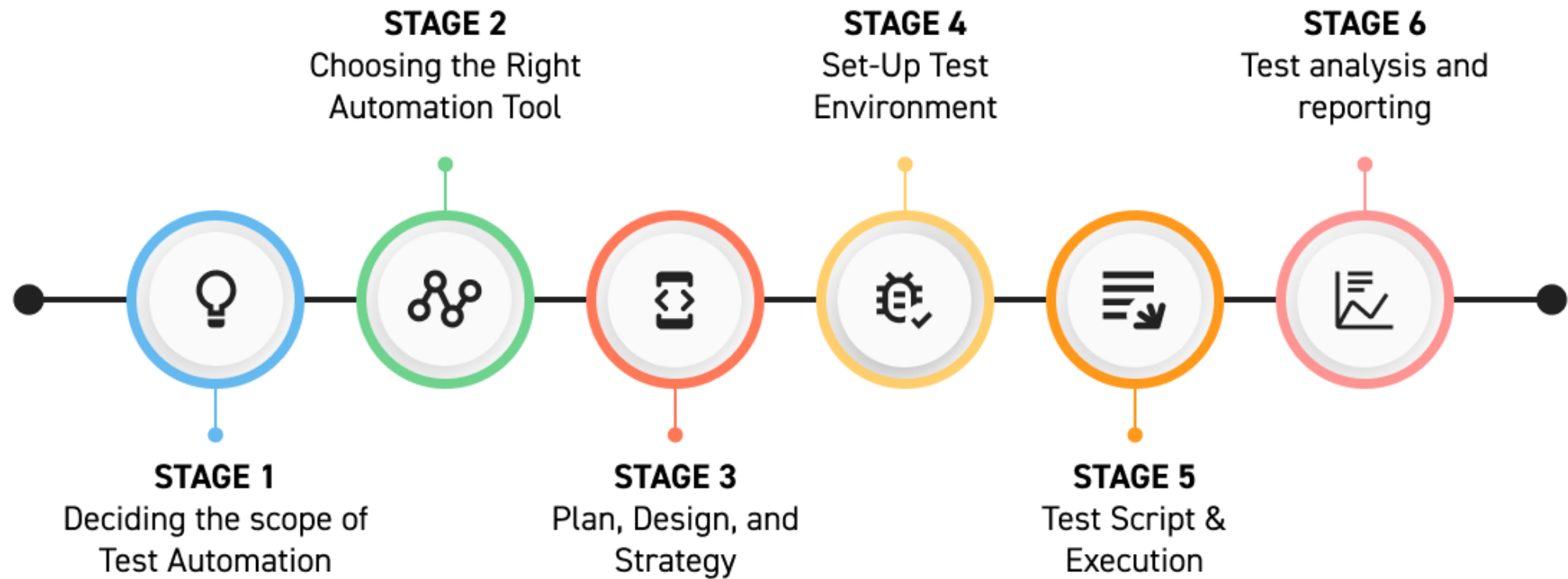
Aujourd'hui :

- ✓ Scripts
- ✓ Reproductibilité
- ✓ Traçabilité



INFRASTRUCTURE AS CODE (IAC)





Talk to our QA experts - www.ratnaglobaltech.com



2. Scripts DBA (Shell / Python)

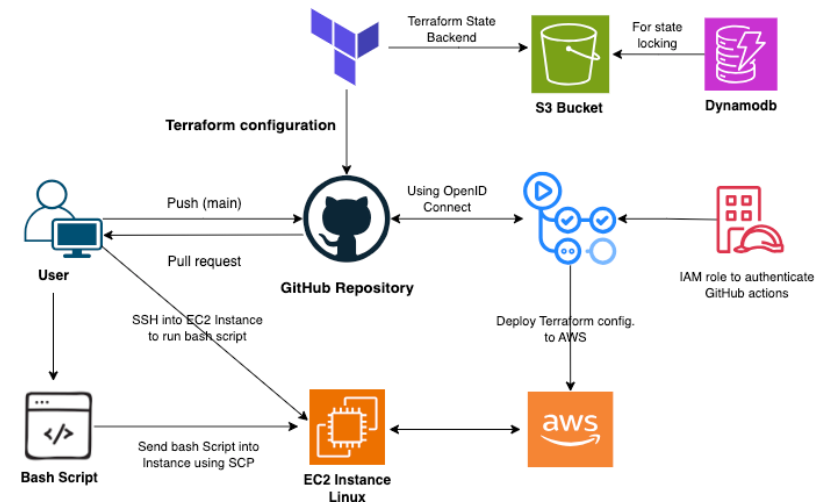


Scripts DBA (Shell / Python)

```
sqlplus -s / as sysdba <<EOF
SELECT tablespace_name, used_percent FROM dba_tablespace_usage_metrics;
EXIT;
```

Exemples automatisés :

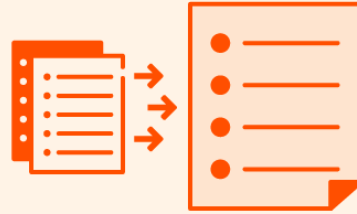
- Vérification tablespaces
- Vérification backups
- Purge logs
- Collecte AWR



Ways to automate with Python



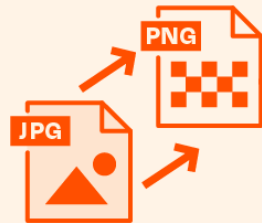
Reading and
writing files



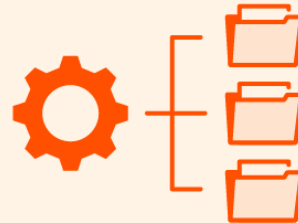
Consolidating
tasks



Interacting
with APIs



Reformatting

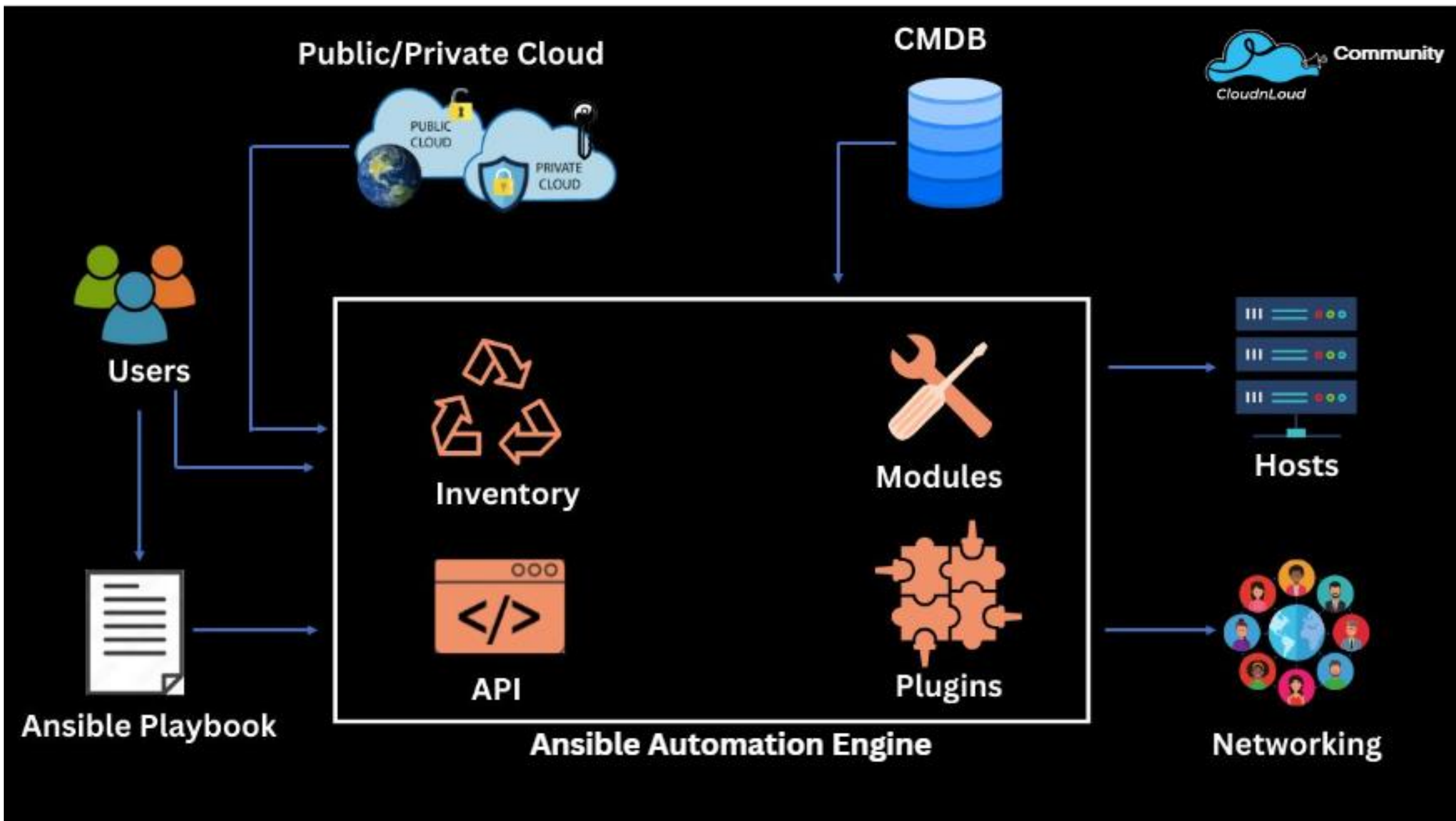


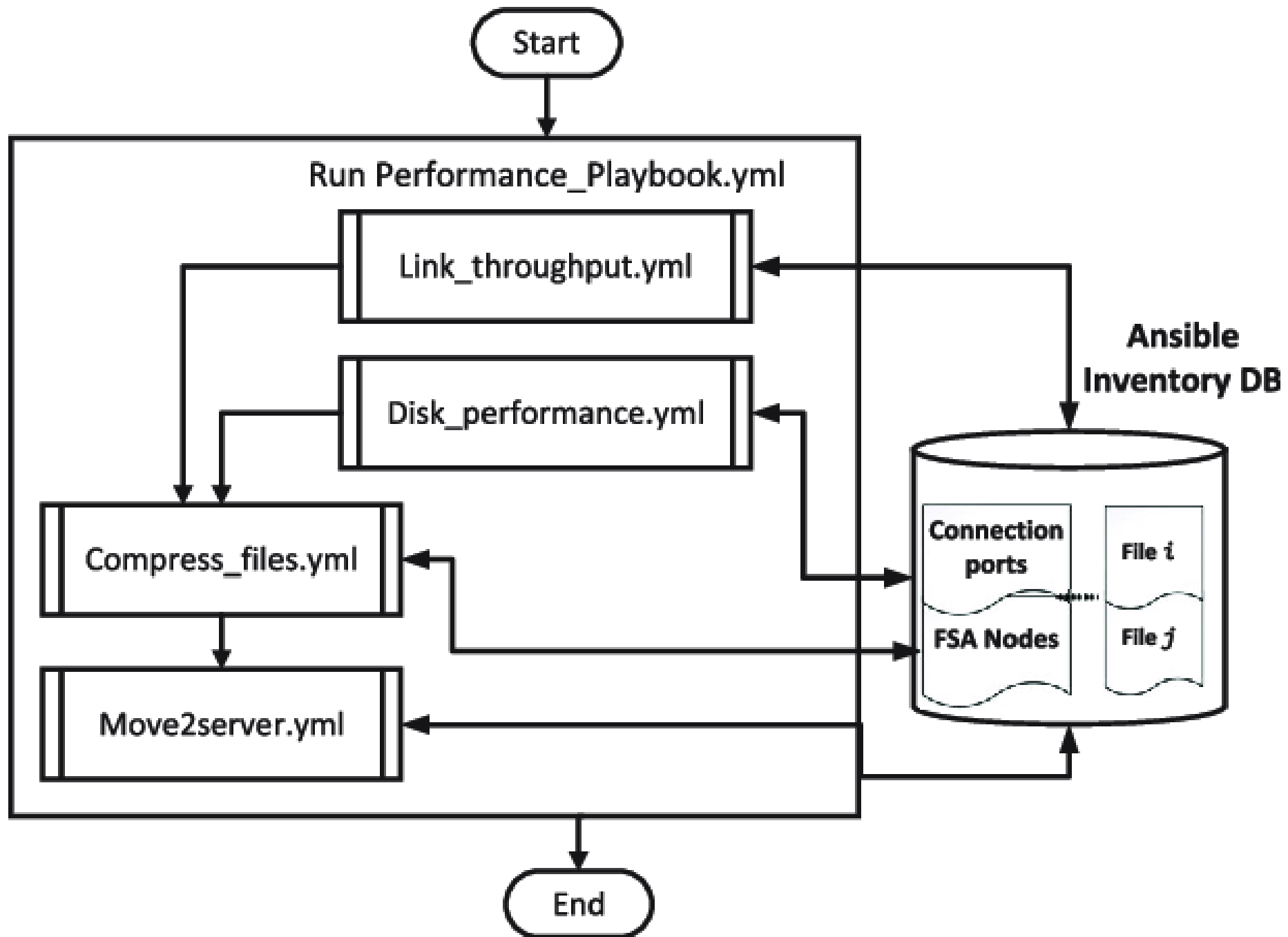
Organizing data



Web scraping

3. Ansible pour Oracle





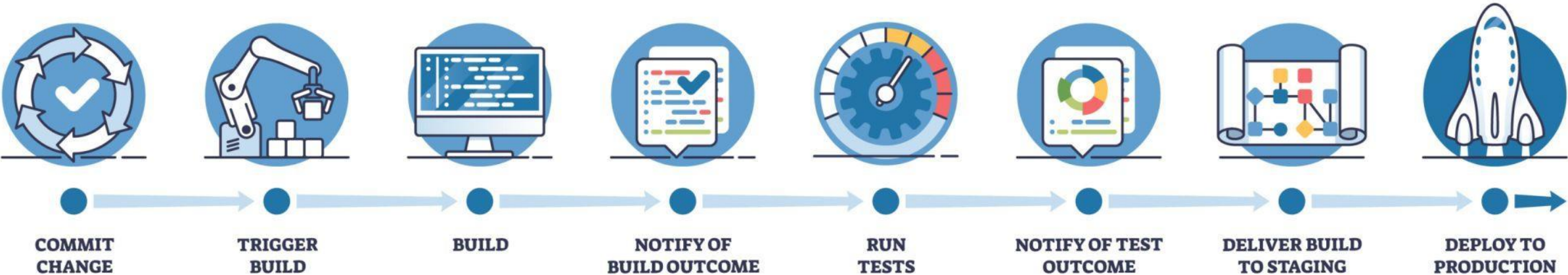
Configuration Management with Ansible

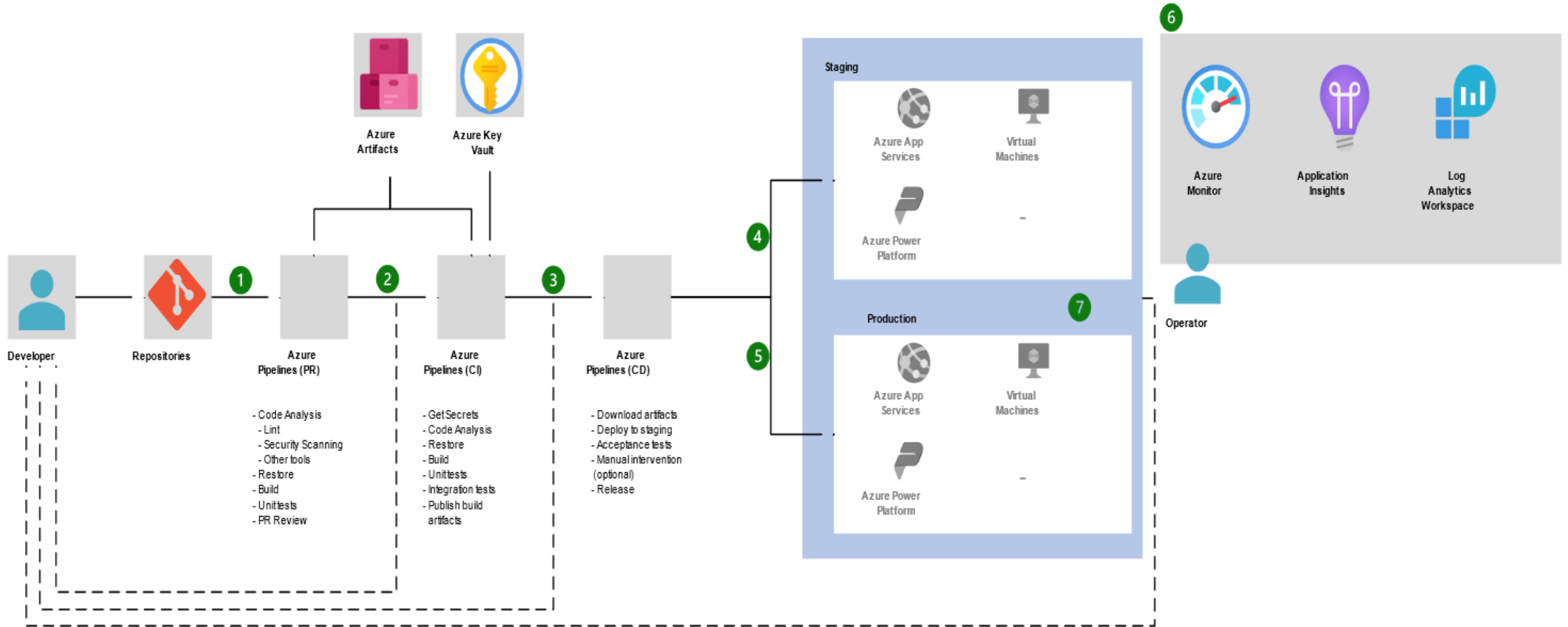


5. CI/CD pour bases de données



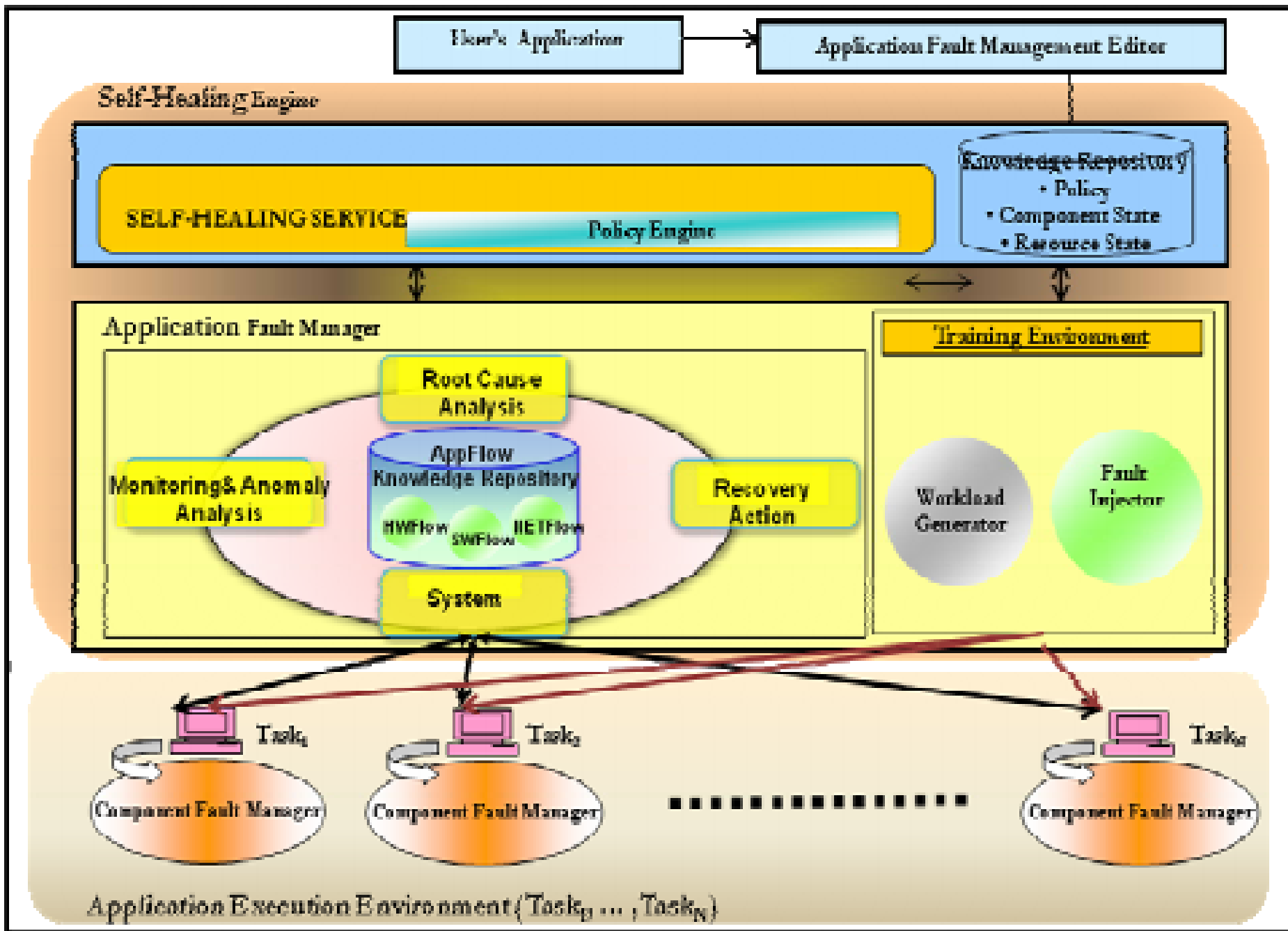
CI CD Pipeline



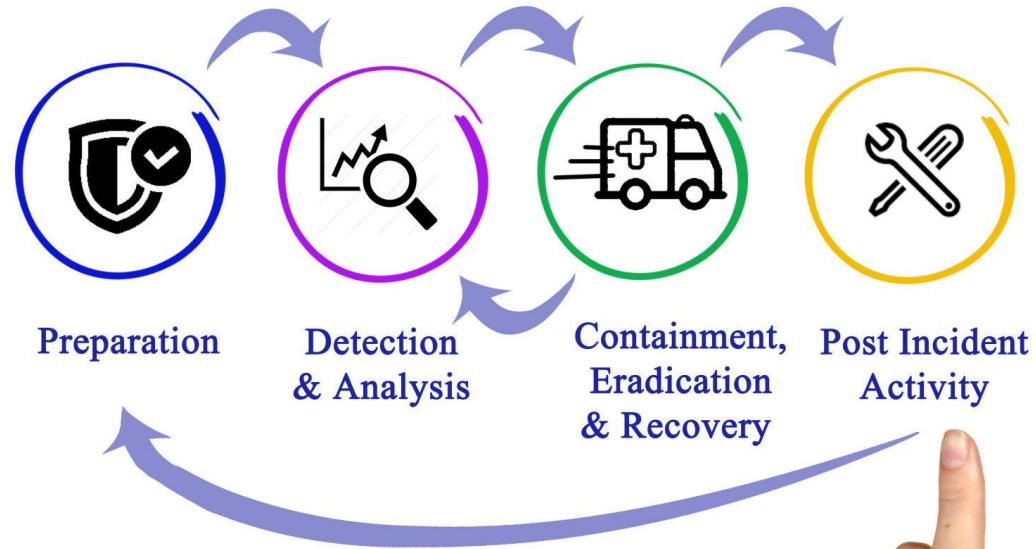


8. Surveillance automatisée + Remédiation





Incident Response Planning



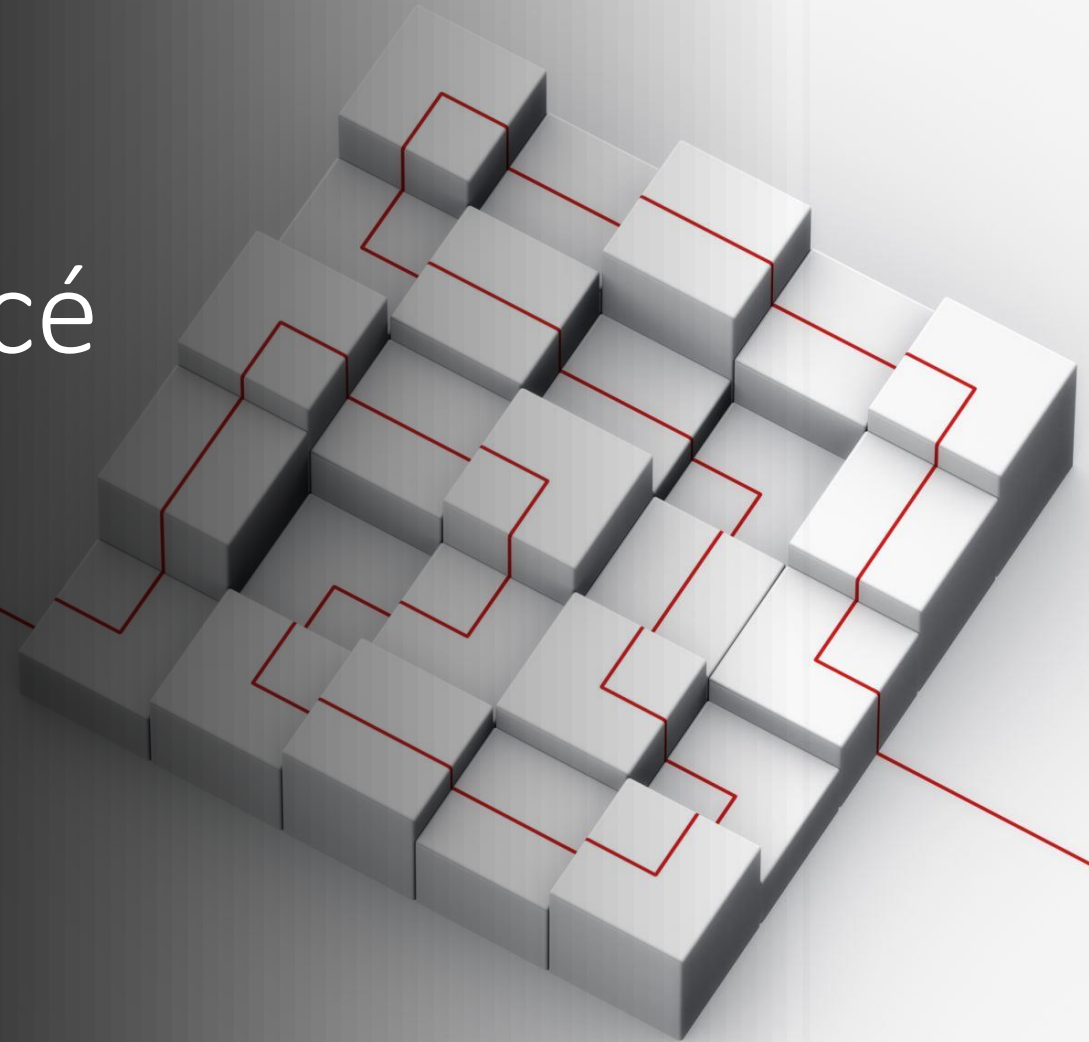
- Shell / Python pour DBA
- Ansible / Terraform
- CI/CD DB (Liquibase/Flyway)
- Versioning des schémas





12

Troubleshooting Avancé



12 – TROUBLESHOOTING AVANCÉ ORACLE

- 1. Méthodologie d'intervention DBA
- 2. Blocages & Verrous (Locks)
- 3. ORA-01555 Snapshot Too Old (UNDO)
- 4. CPU à 100%
- 5. I/O Saturé
- 6. Explosion de l'ARCHIVE LOG
- 7. Latch / Mutex Contention
- 8. Temp Tablespace Saturé
- 9. Incident Post-Release Applicatif



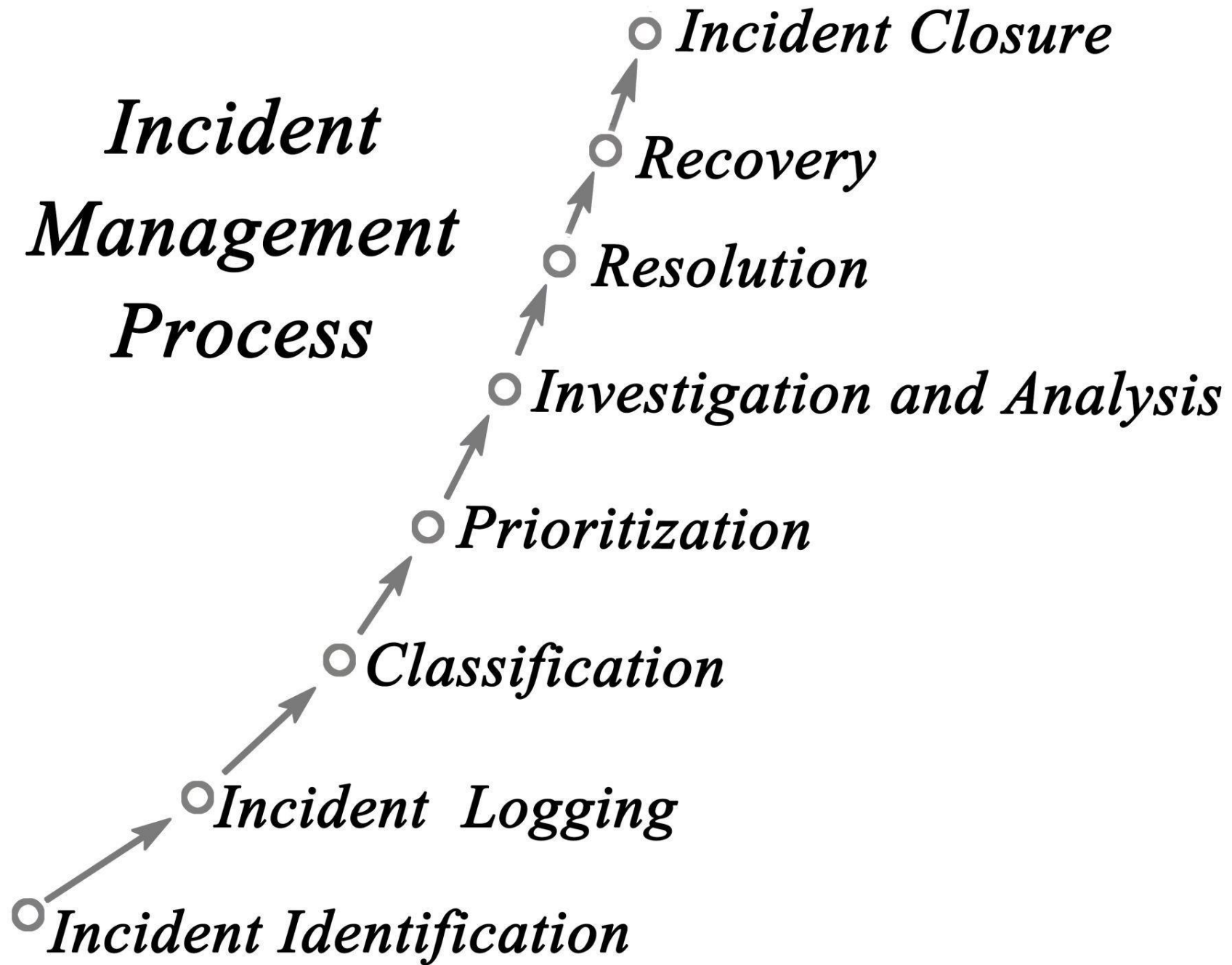
1. Méthodologie d'intervention DBA



Méthodologie
d'intervention
DBA

- 1 Observer (symptômes)
- 2 Identifier le goulot
- 3 Isoler la cause
- 4 Corriger sans aggraver
- 5 Analyser post-mortem

“Je ne redémarre jamais une base sans comprendre pourquoi elle est lente.”



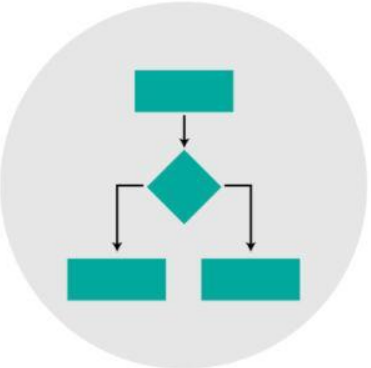
Root Cause Analysis Process



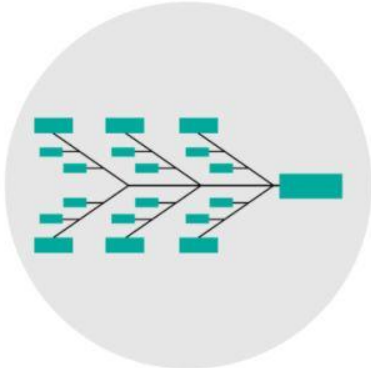
Define the problem



Collect data



Identify possible casual factors



Identify the root cause



Implement the solution



Monitor the solution

2. Blocages & Verrous (Locks)



Blocages & Verrous (Locks)

Symptôme

Application figée, requêtes en attente

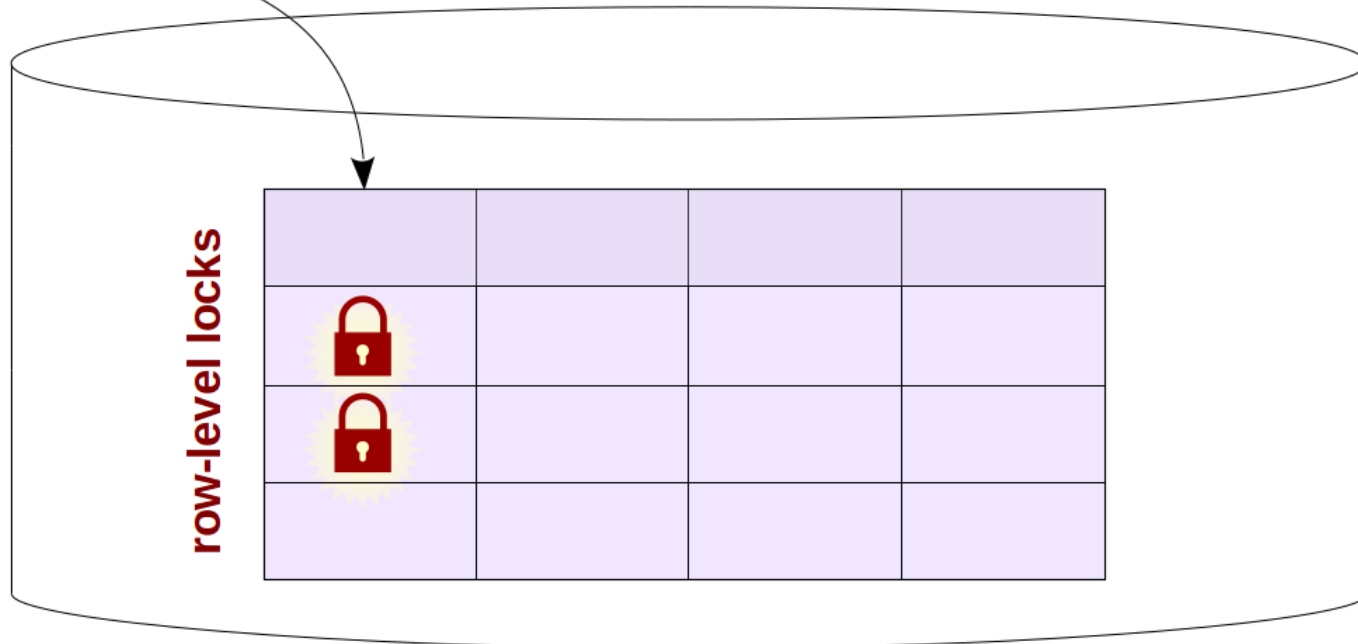
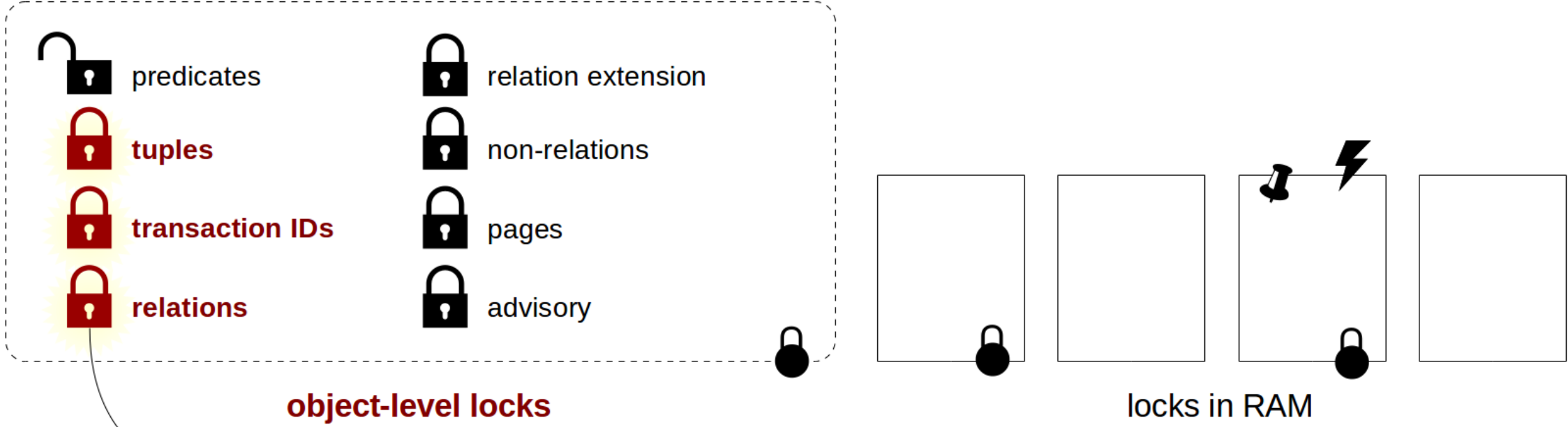
```
SELECT blocking_session, sid, serial#, event  
FROM v$session  
WHERE blocking_session IS NOT NULL;
```

Cause Typique

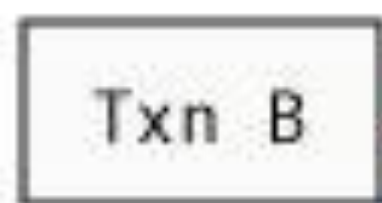
Transaction oubliée ouverte

 Action DBA :

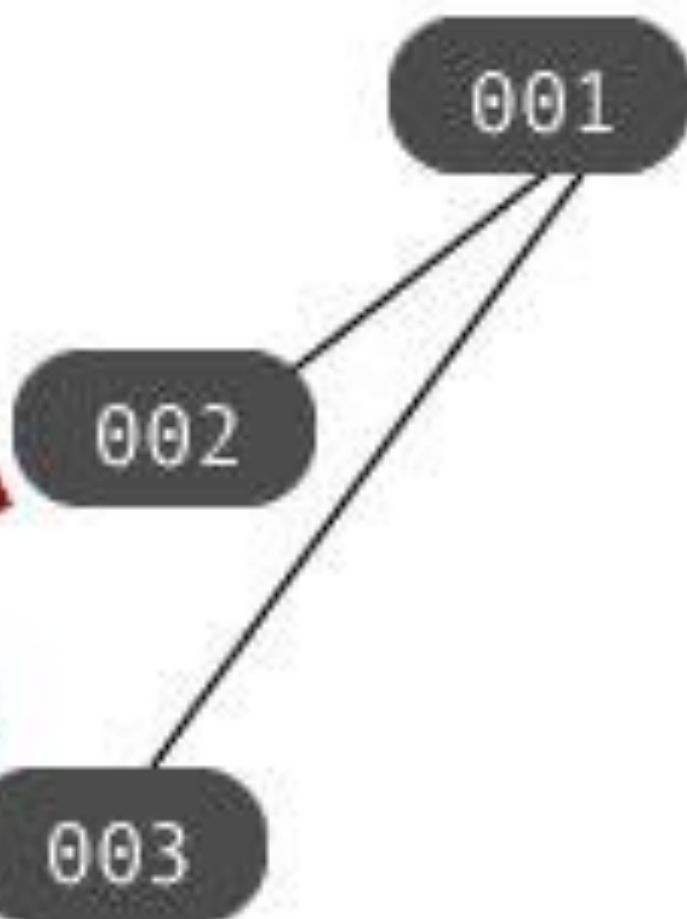
Identifier session bloquante → contacter appli → kill si nécessaire



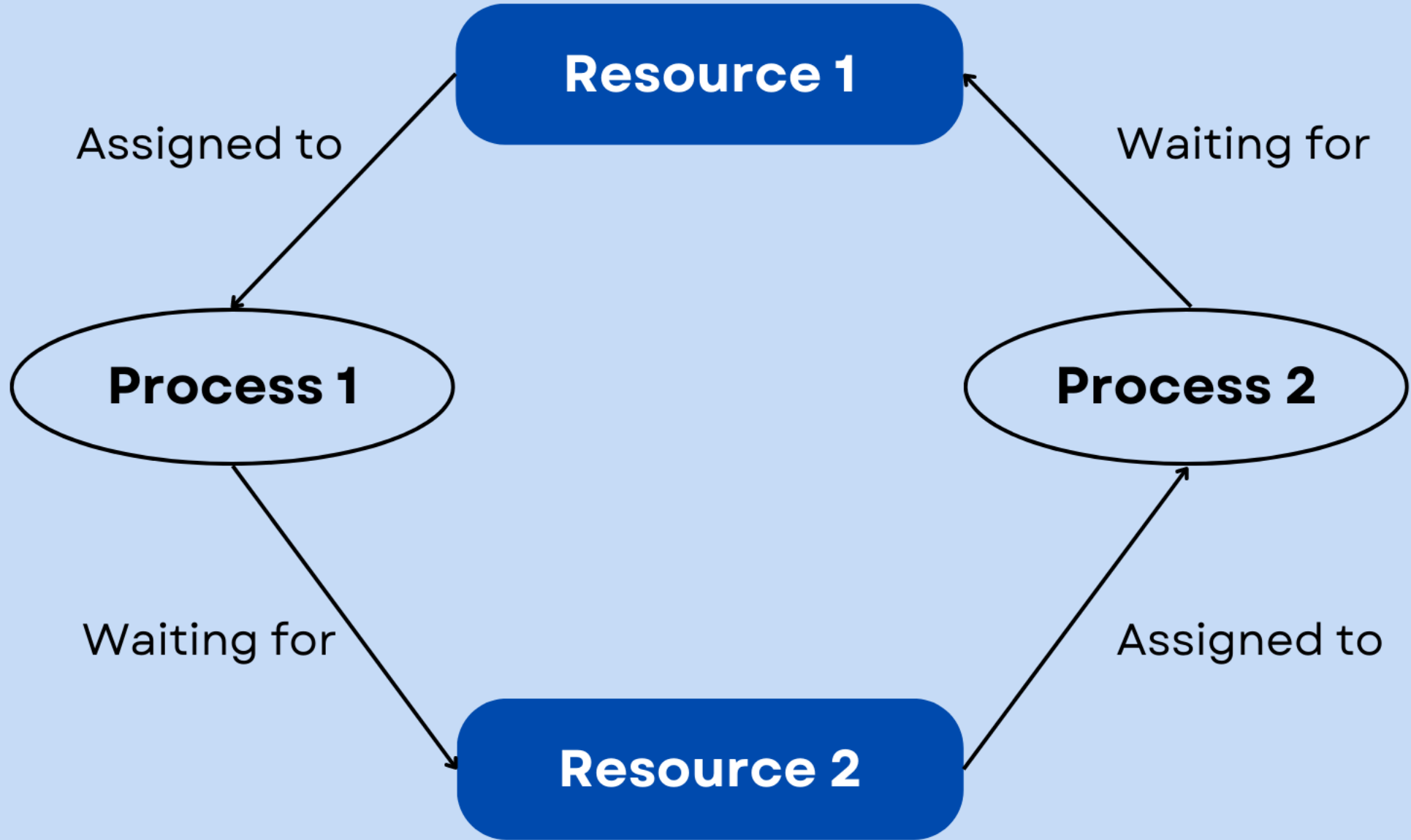
Txn A blocked by
Txn B.



Txn B
blocked by Txn A



Txn A and Txn B are
deadlocked



3. ORA-01555 Snapshot Too Old (UNDO)



ORA-01555 Snapshot Too Old (UNDO)

Symptôme

Requêtes longues échouent



Cause Typique

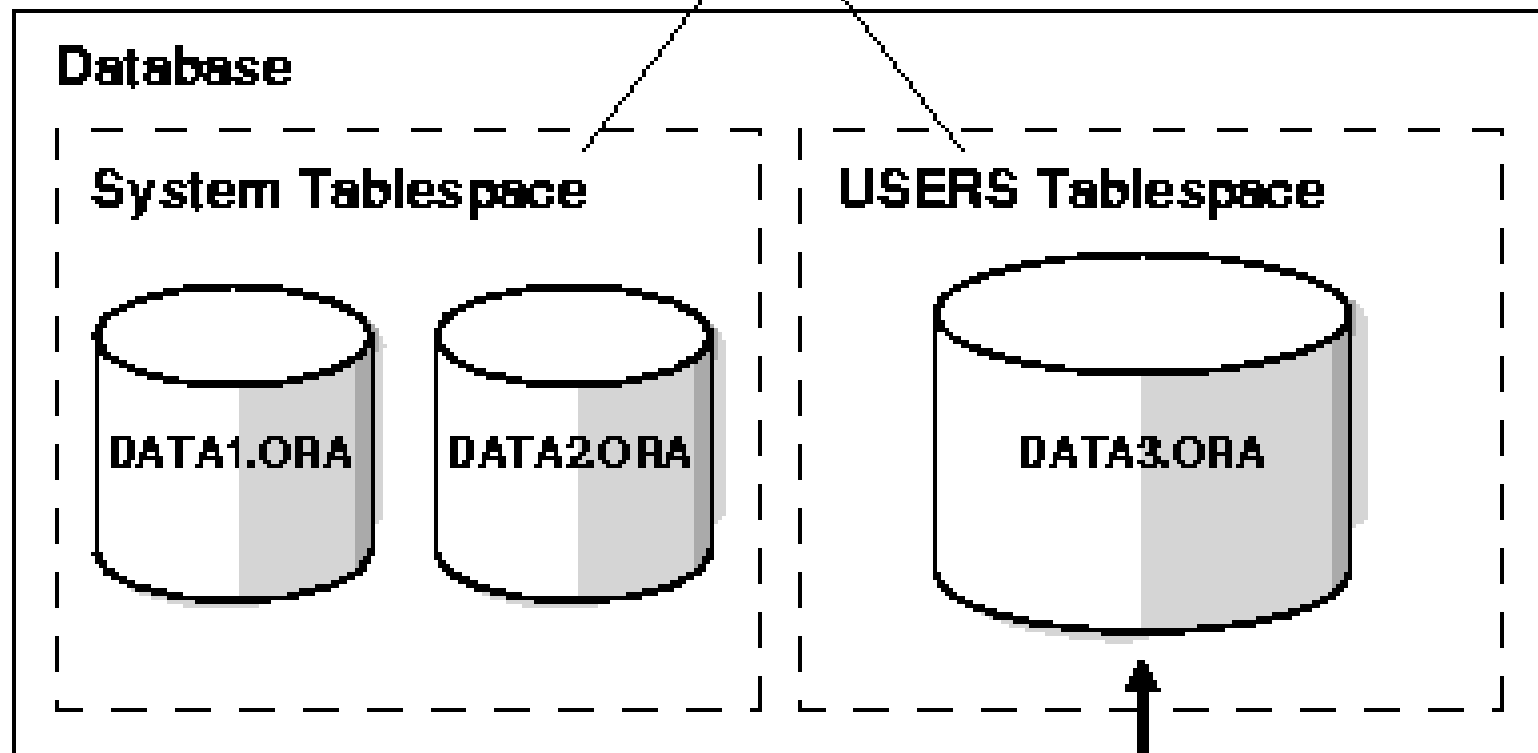
UNDO trop petit ou requêtes trop longues

```
SELECT tuned_undoretention FROM v$undostat;
```

Solution :

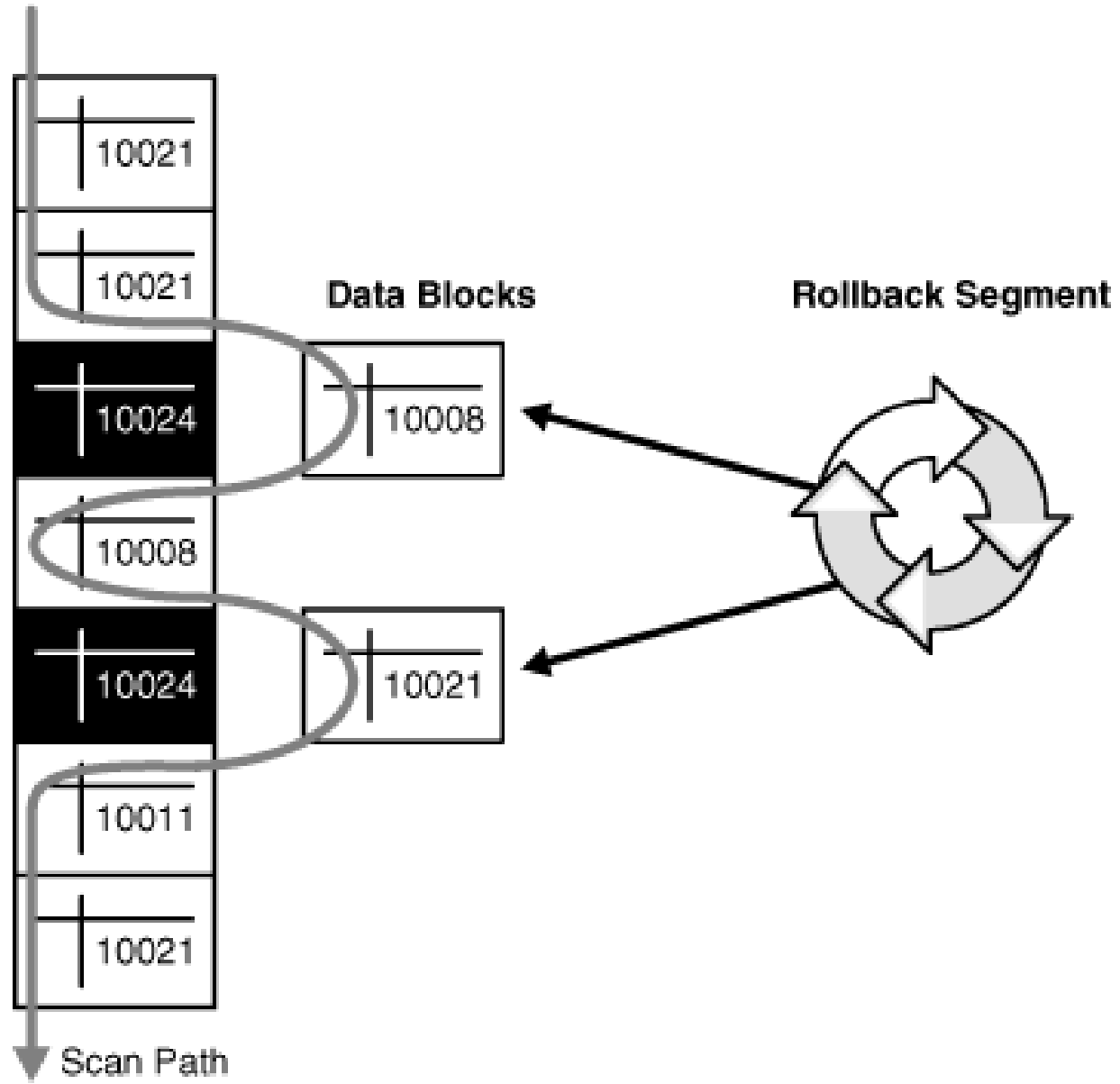
- Augmenter UNDO
- Optimiser requête

Two Tablespaces



```
CREATE TABLESPACE users  
DATAFILE 'DATA3.ORA'
```

SELECT ...
(SCN 10023)



4. CPU à 100%



CPU à 100%

Symptôme

CPU à 100%

Diagnostic

```
SELECT sql_id, cpu_time/1000000 cpu_sec  
FROM v$sql  
ORDER BY cpu_time DESC FETCH FIRST 10 ROWS ONLY;
```

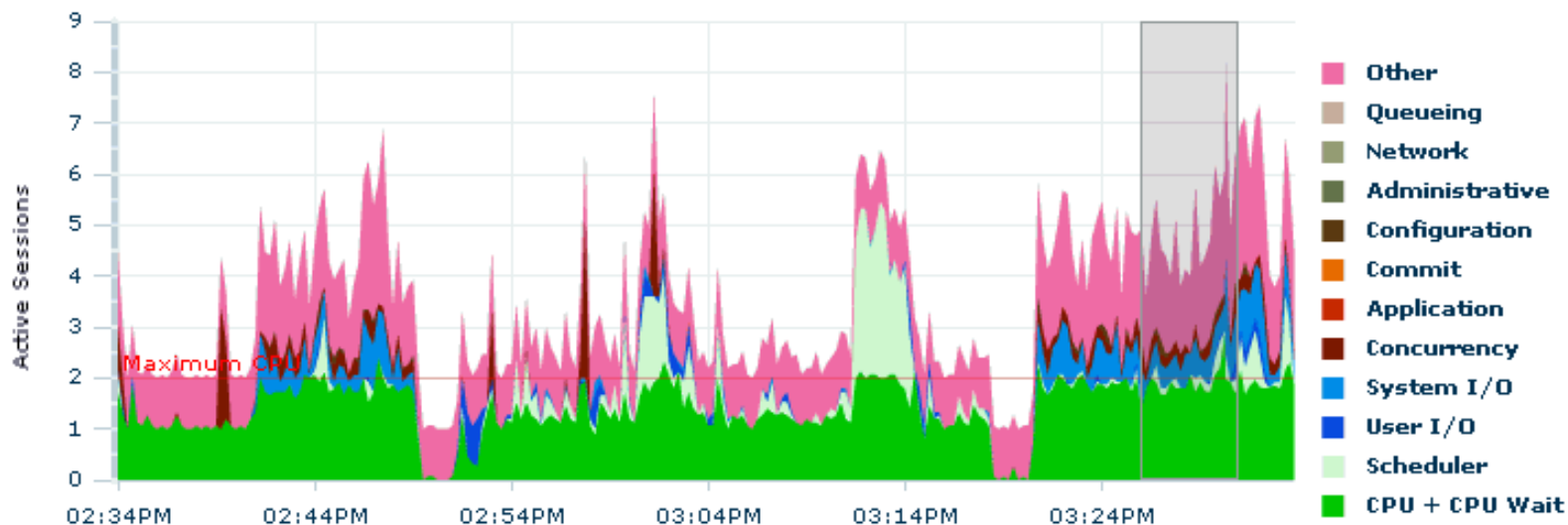
Cause typique

- Full scan massif
- Requête mal indexée

Top Activity

Drag the shaded box to change the time period for the detail section below.

View Data Real Time: 15 Second Refresh



Detail for Selected 5 Minute Interval

Start Time Dec 30, 2011 3:26:00 PM

Run ASH Report

Top SQL

Actions Schedule SQL Tuning Advisor Go

Select All | Select None

Select	Activity (%)	SQL ID	SQL Type
<input type="checkbox"/>	17.40	ddthrb7j9a63f	SELECT
<input type="checkbox"/>	15.06	axabnfyp4r3p	SELECT
<input type="checkbox"/>	11.99	f8ybh6brs1uq2	SELECT
<input type="checkbox"/>	9.36	94fzm3jx1c1yp	PL/SQL EXECUTE
<input type="checkbox"/>	7.46	95adfchfv58a5	UPDATE
<input type="checkbox"/>	5.85	gff0kbjwvbsf8	SELECT

Top Sessions

View Top Sessions

Activity (%)	Session ID	User Name	Program
19.91	102	SH	sqlplus@ (TNS V1-V
19.91	90	SYS	oracle@d (OFSD)
19.84	19	HR	sqlplus@ (TNS V1-V
8.06	7	SYS	oracle@d (LG00)
7.92	8	SYS	oracle@d (LG01)
5.33	10	SYS	oracle@d (LG03)

Time range:

Custom (1h 30m)

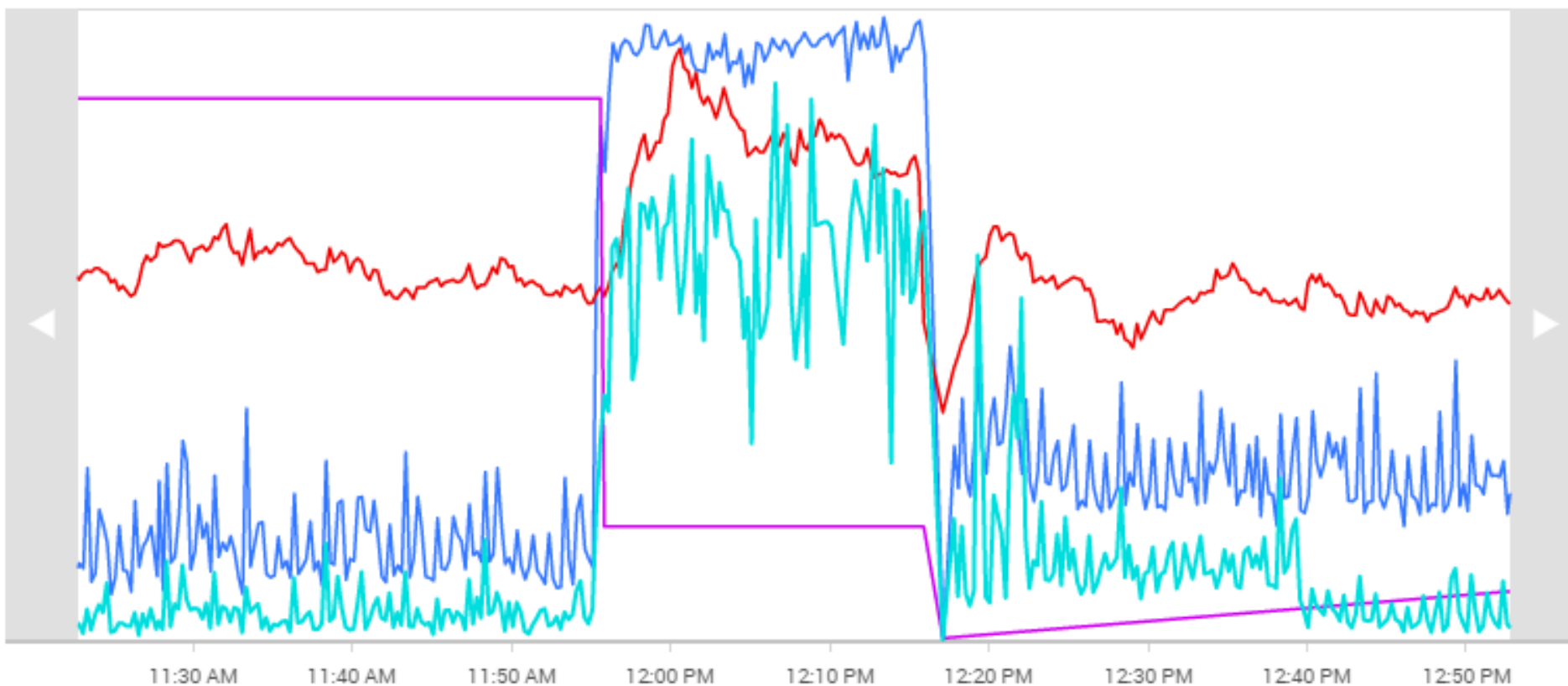
Thu, Mar 16 11:22

Thu, Mar 16 12:52



COMPARE BASELINE

Last 1h Last 6h Last 24h Last 7 days Today This week | Export (csv)



SQL Server: processor time

User connections

Buffer page life expectancy

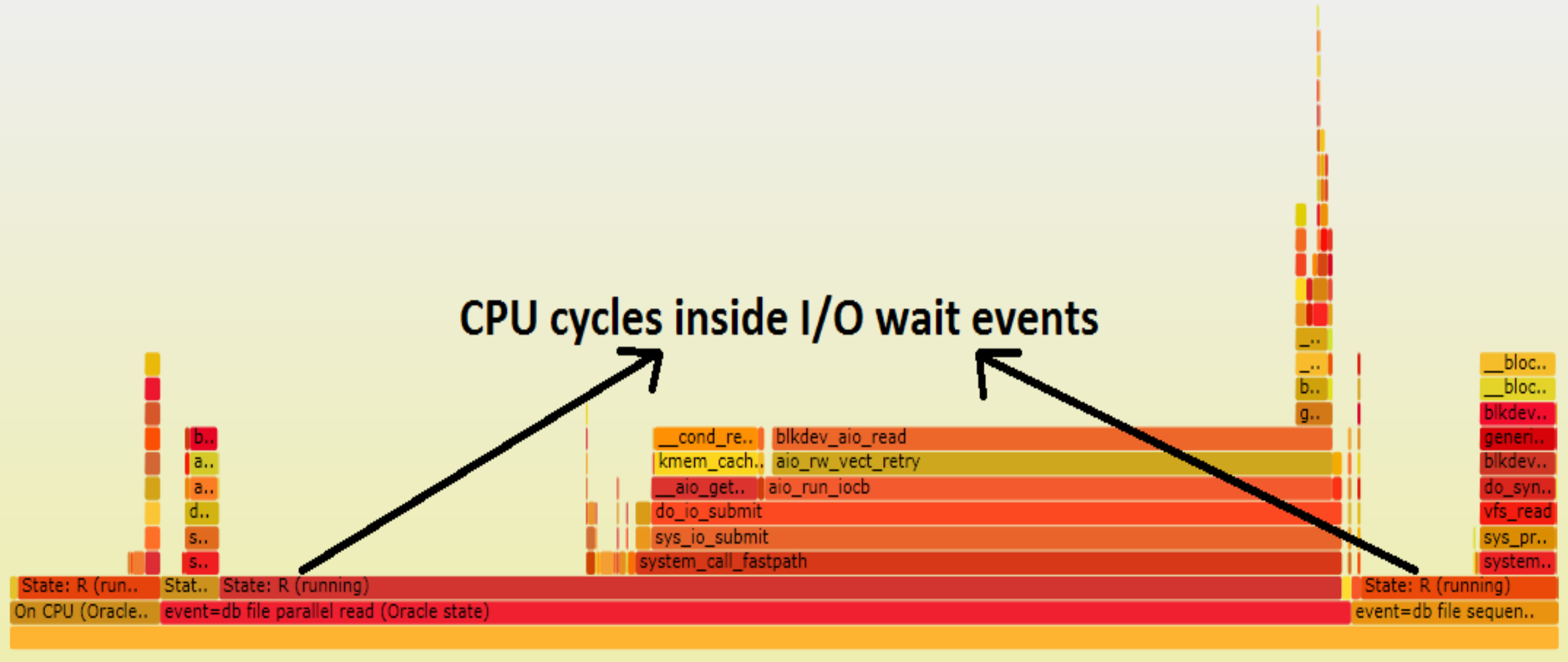
Latch wait time

5. I/O Saturé



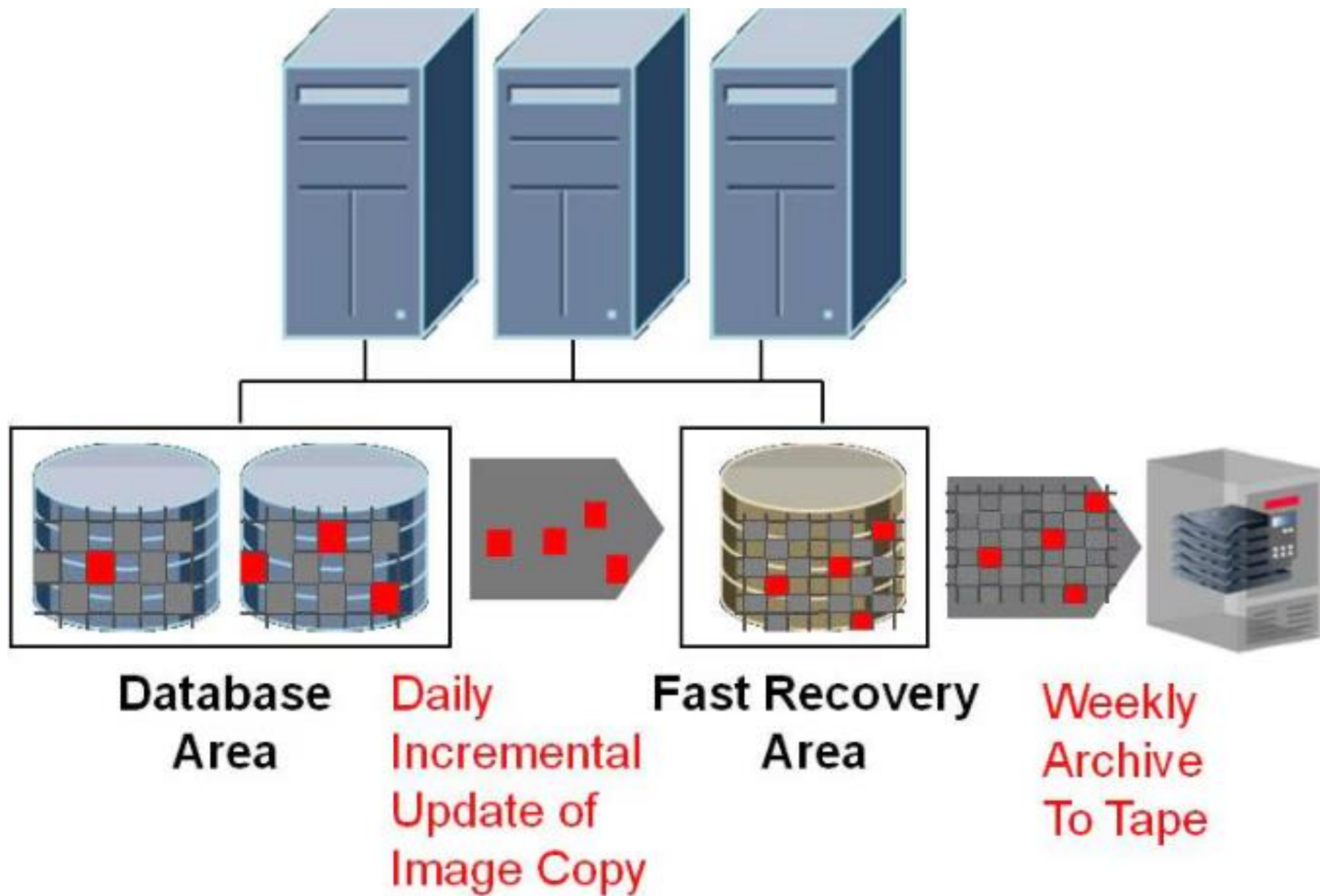


CPU cycles inside I/O wait events



6. Explosion de l'ARCHIVE LOG





7. Latch / Mutex Contention



Symptôme :

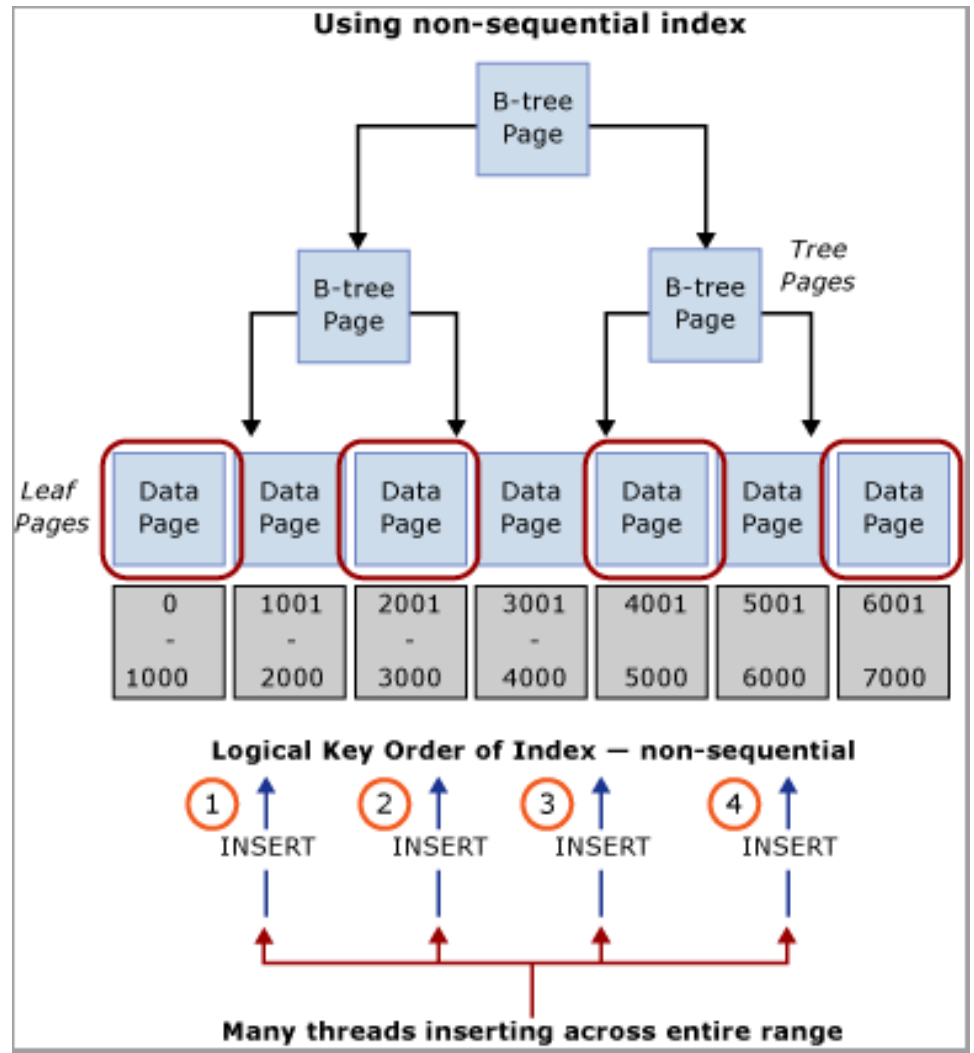
Base lente sans CPU ni I/O saturé

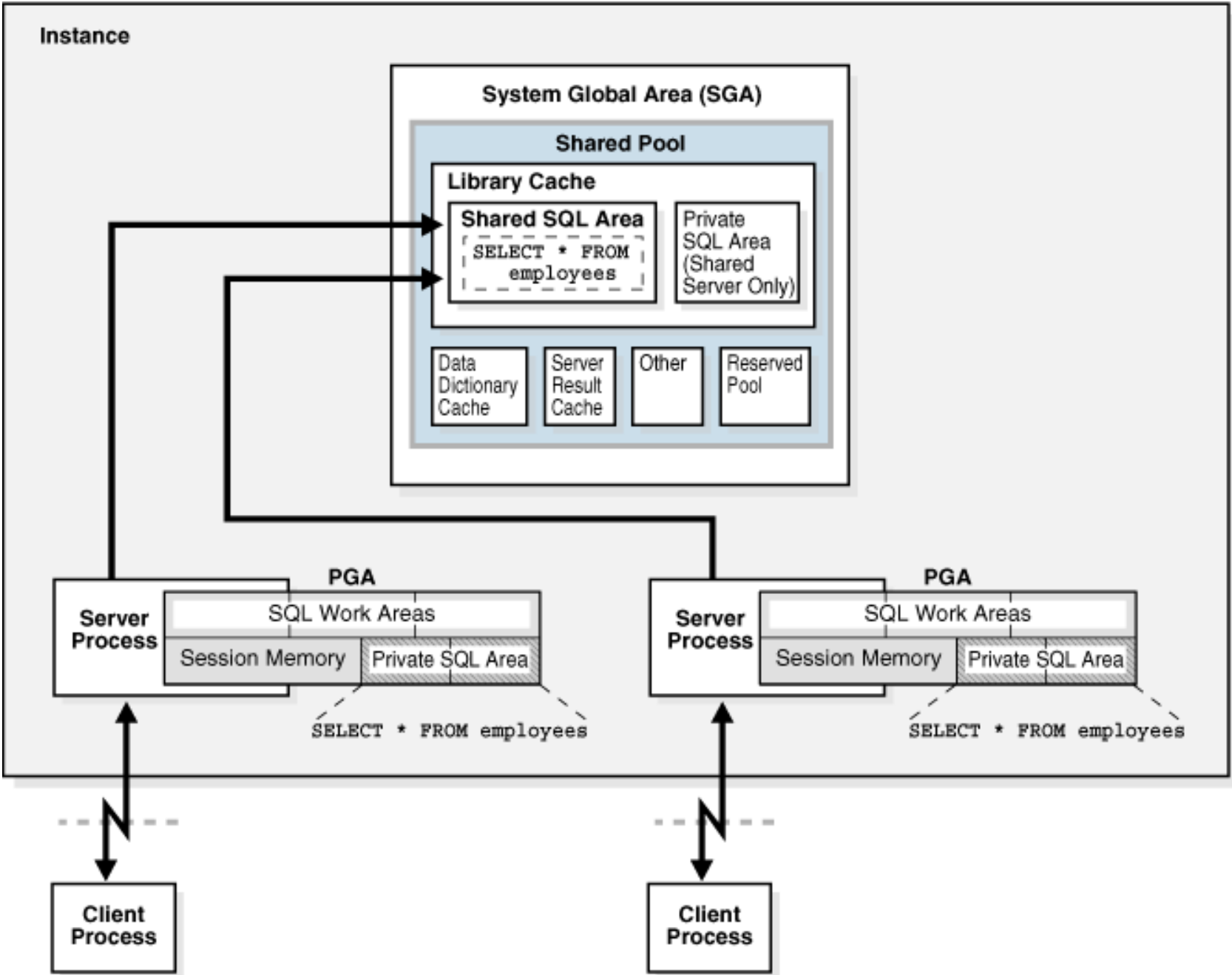
Cause :

Hard parsing massif

Solution :

Augmenter shared pool + bind variables





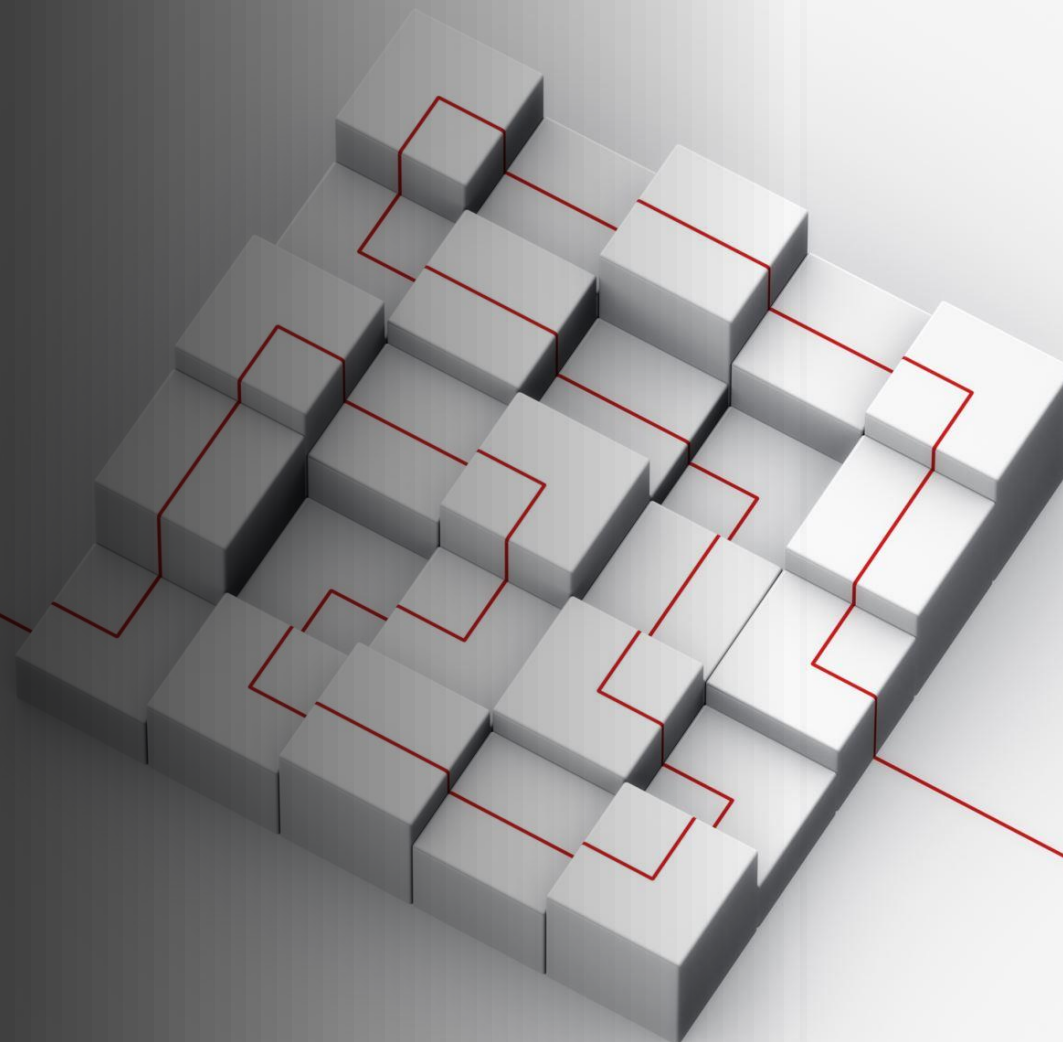
- Base figée / verrous
- Explosion UNDO
- Archive log saturé
- CPU à 100%
- Incident post-release applicatif





13

Gouvernance & Rôle Stratégique



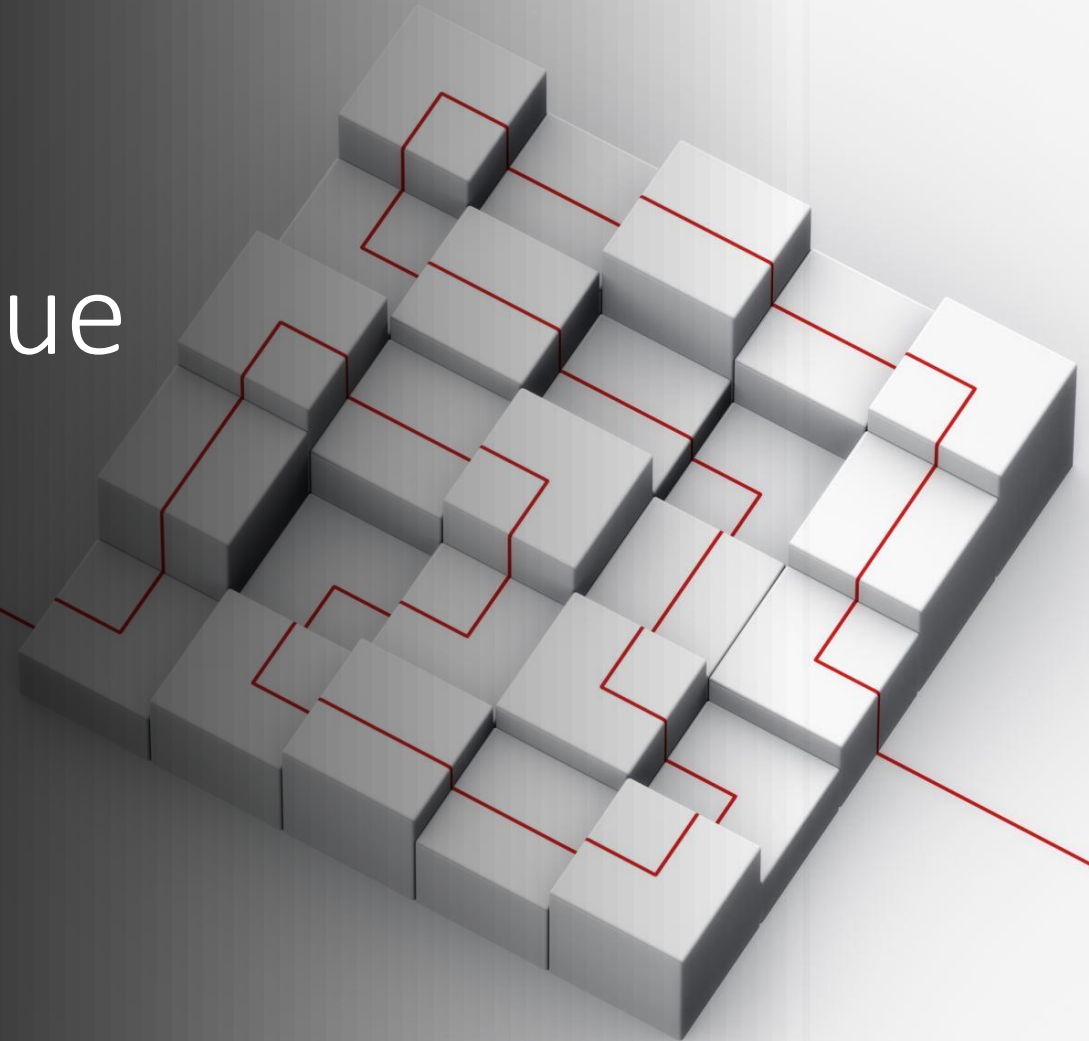
- Dialogue avec les devs
- Revue d'architecture SQL
- Standards de dev DB
- Documentation & procédures
- Anticipation de la croissance





14

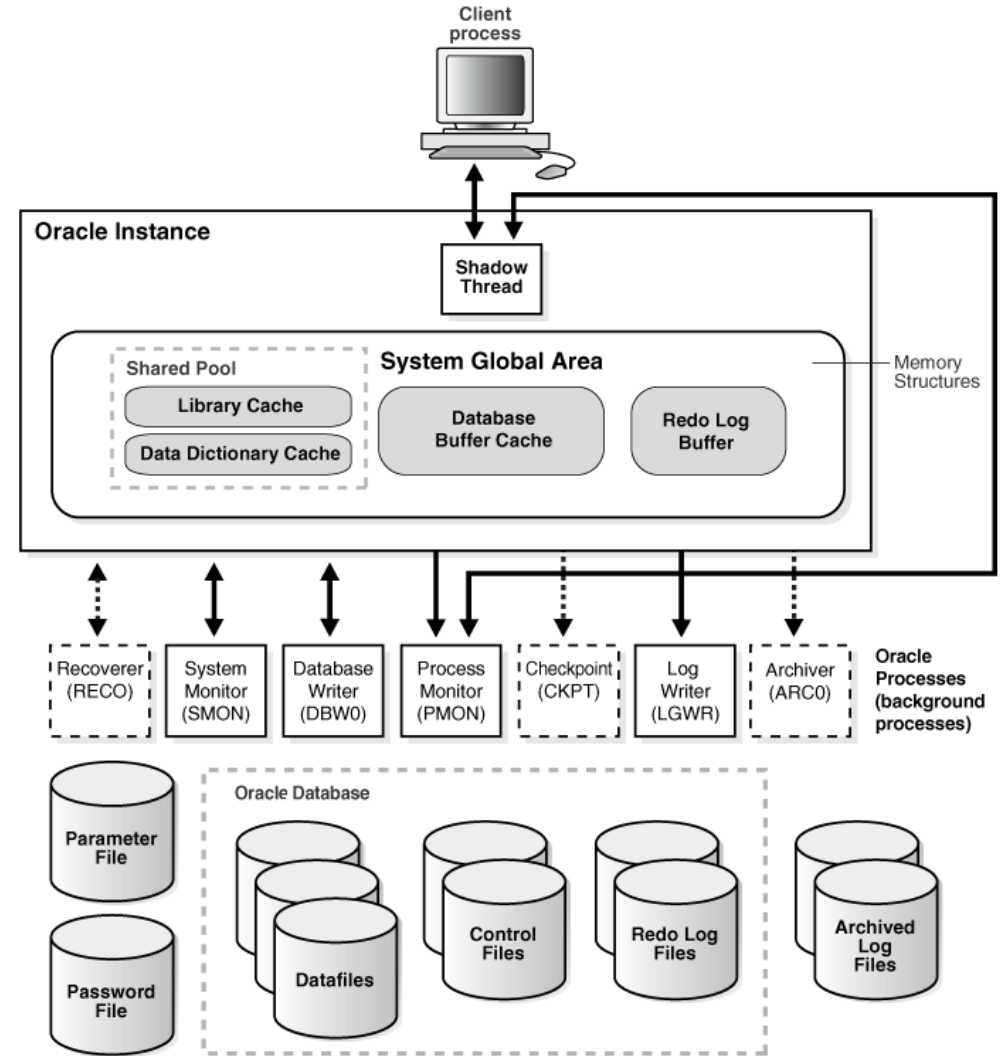
PL/SQL : Rôle stratégique



PL/SQL (Procedural Language/SQL) est le langage procédural intégré à Oracle Database.
 Pour un DBA, ce n'est pas juste un outil de dev — c'est un levier de performance, d'automatisation et de fiabilité.

Pourquoi c'est clé pour un DBA ?

Domaine	Apport PL/SQL
Performance	Traitements côté serveur → moins de réseau
Automatisation	Jobs, maintenance, contrôles
Sécurité	Procédures encapsulées
Supervision	Scripts d'analyse avancée
Exploitation	Tâches récurrentes automatisées



- Declaration
 - t_EmpRecord
 - t_DeptRecord
- DeptName
 - Parameter list
 - Declaration
 - Code section
 - If
 - Condition
 - Code section
 - Code section
 - Select
 - Statement
 - Exception handler
- MgrName
- FetchRecord
- InsertRecord
- UpdateRecord

```

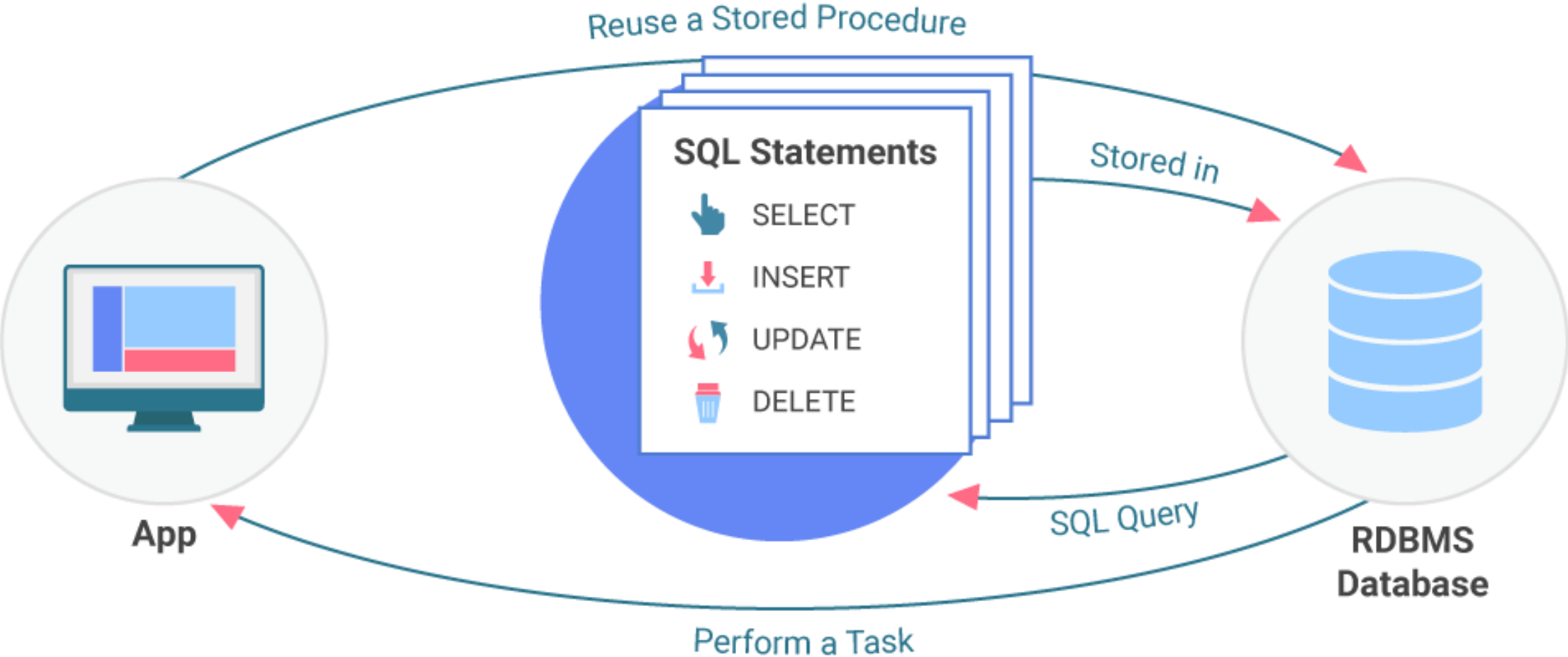
24  -- Return the name of the department
25  function DeptName (p_empno in emp.empno%type) return dept.dname%type is
26      result dept.dname%type;
27  begin
28      if p_empno is null then
29          -- If empno is null, return an unknown name
30          result := 'Unknown';
31      else
32          -- Fetch the name of the department
33          select dept.dname
34              into result
35              from dept,
36                  emp
37              where emp.empno = p_empno
38                 and dept.deptno = emp.dept;
39      end if;
40      return(result);
41  exception
42      -- If the employee does not
43      when no_data_found then
44          return(null);
45  end DeptName;

```

empno	number(4)
ename	varchar2(10)
job	varchar2(9)
mgr	number(4)
hiredate	date

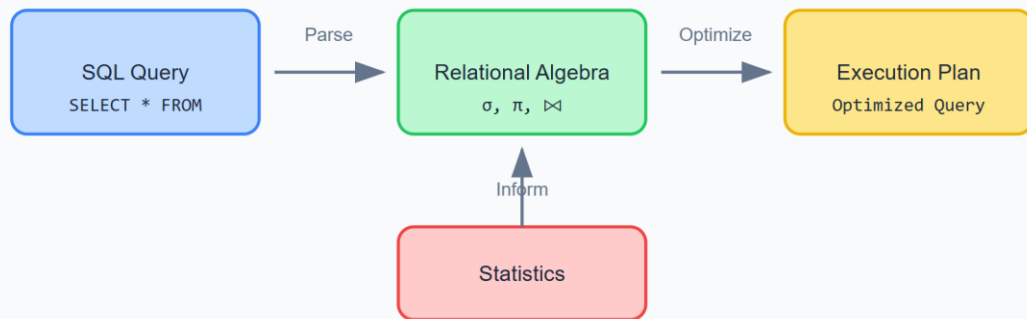
38 PLS-00302: component 'DEPT' must be declared
 38 PL/SQL: ORA-00904: "EMP"."DEPT": invalid identifier
 33 PL/SQL: SQL Statement ignored

Stored Procedures



PL/SQL et performance

Query Optimization Process



PL/SQL permet de réduire les allers-retours réseau.

Exemple de gain classique

Méthode	Impact
SQL appelé ligne par ligne depuis l'application	Lenteur réseau
Traitement PL/SQL en bloc côté serveur	Forte accélération

Outils DBA liés à PL/SQL

Fonction	Usage DBA
BULK COLLECT	Lecture massive efficace
FORALL	Inserts/updates batch
Packages	Logique optimisée centralisée
DBMS_STATS	Gestion statistiques

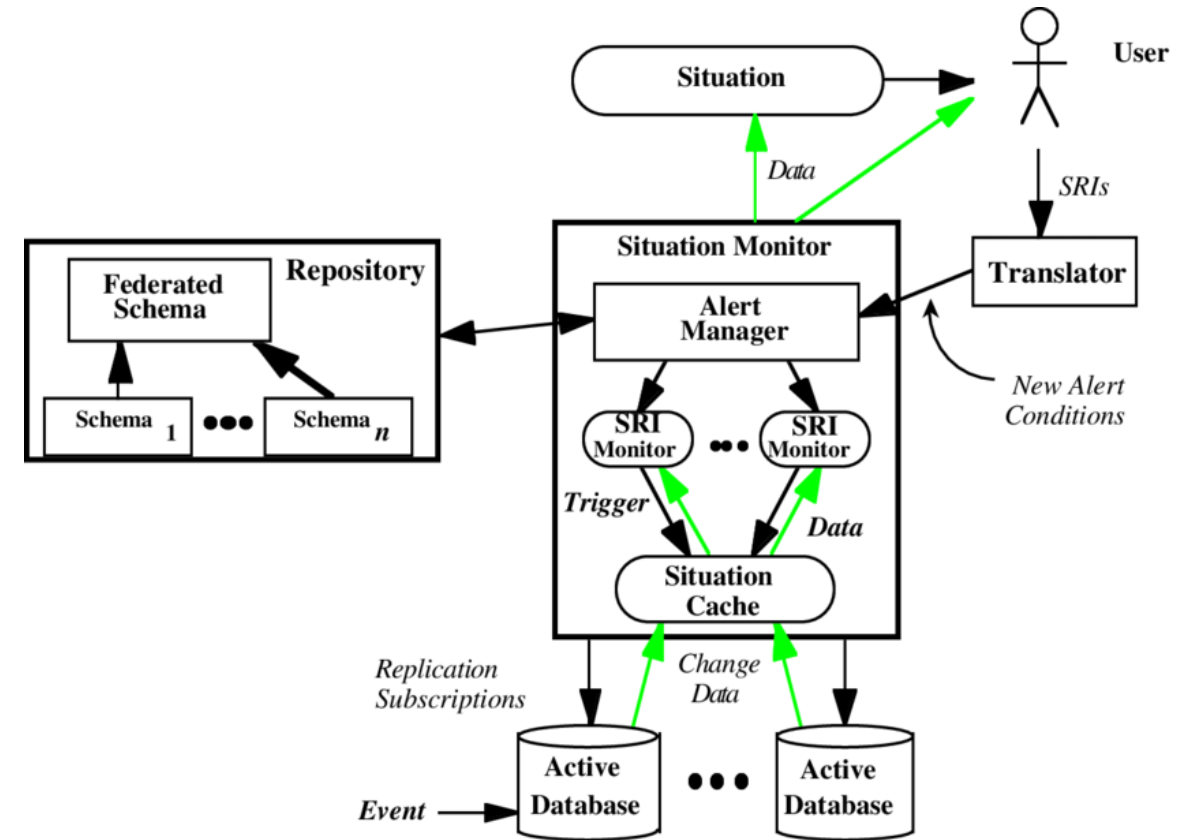
PL/SQL pour l'automatisation DBA

Un DBA Oracle automatise énormément via PL/SQL.

Exemples concrets

Tâche	Implémentation
Purge de données anciennes	Procédure planifiée
Rebuild d'index	Script PL/SQL
Vérification tablespaces	Package monitoring
Alertes internes	DBMS_ALERT / DBMS_SCHEDULER

PL/SQL devient le bras droit du DBA pour le RUN.

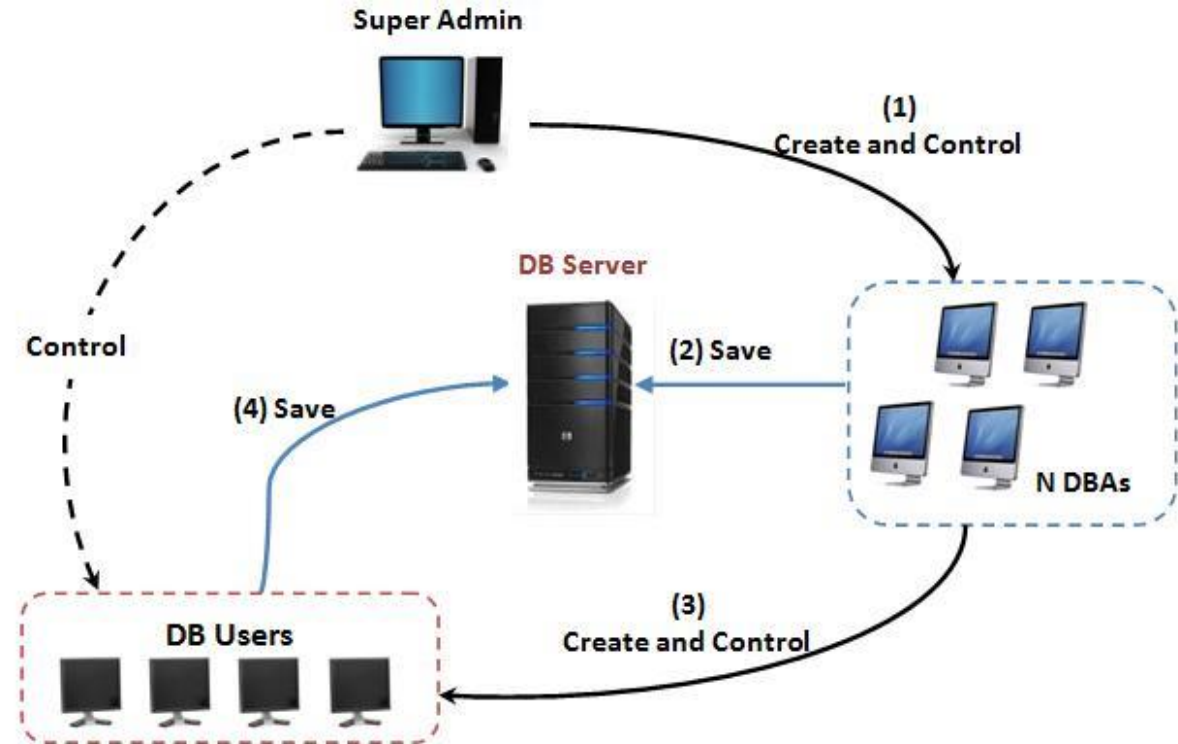


PL/SQL et sécurité

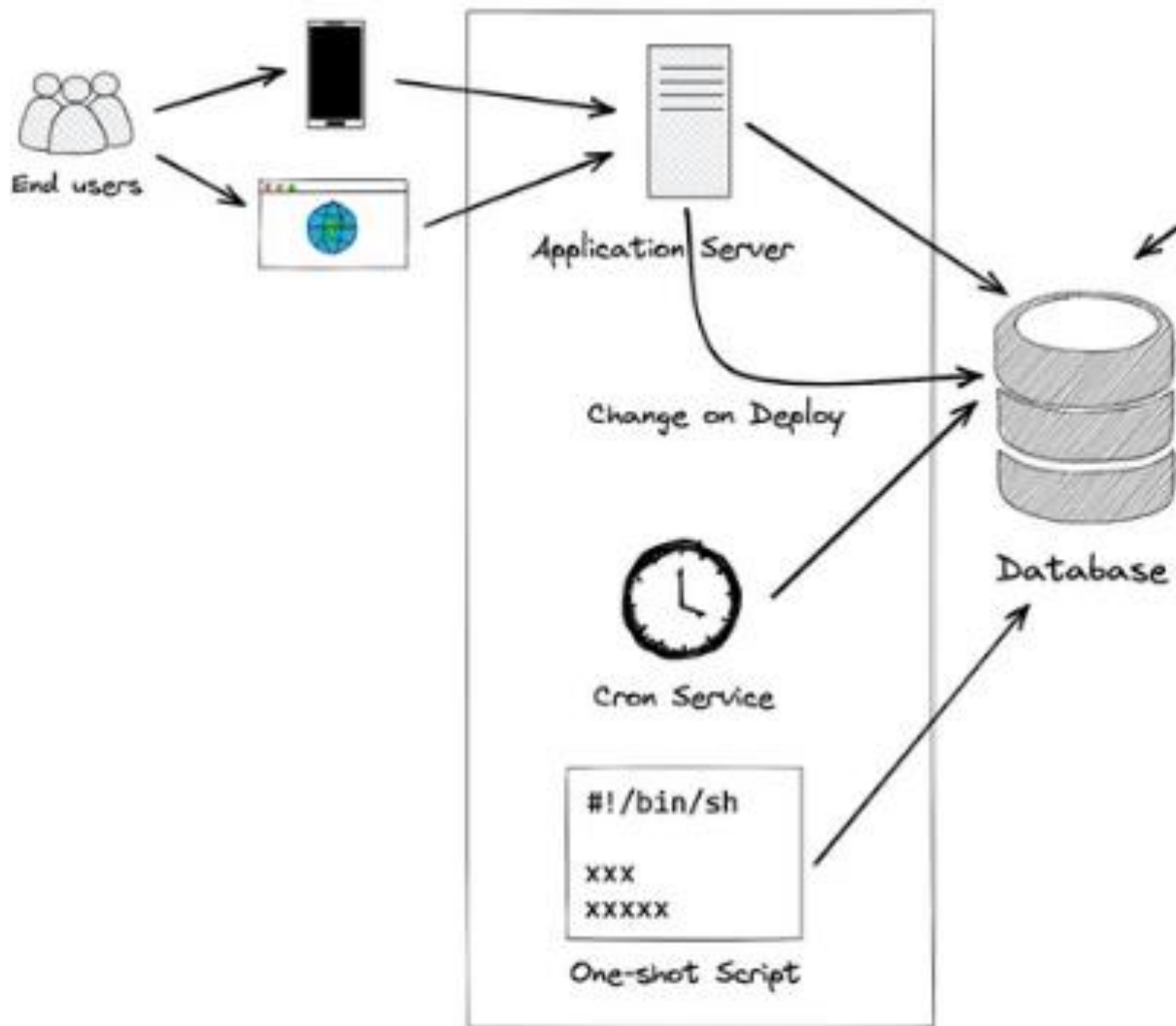
PL/SQL renforce la sécurité via l'encapsulation.

Fonction	Bénéfice
Procédures stockées	Masquent les tables
Packages	Contrôle logique accès
Droits EXECUTE	Pas d'accès direct aux données
Validation interne	Protection contre injections

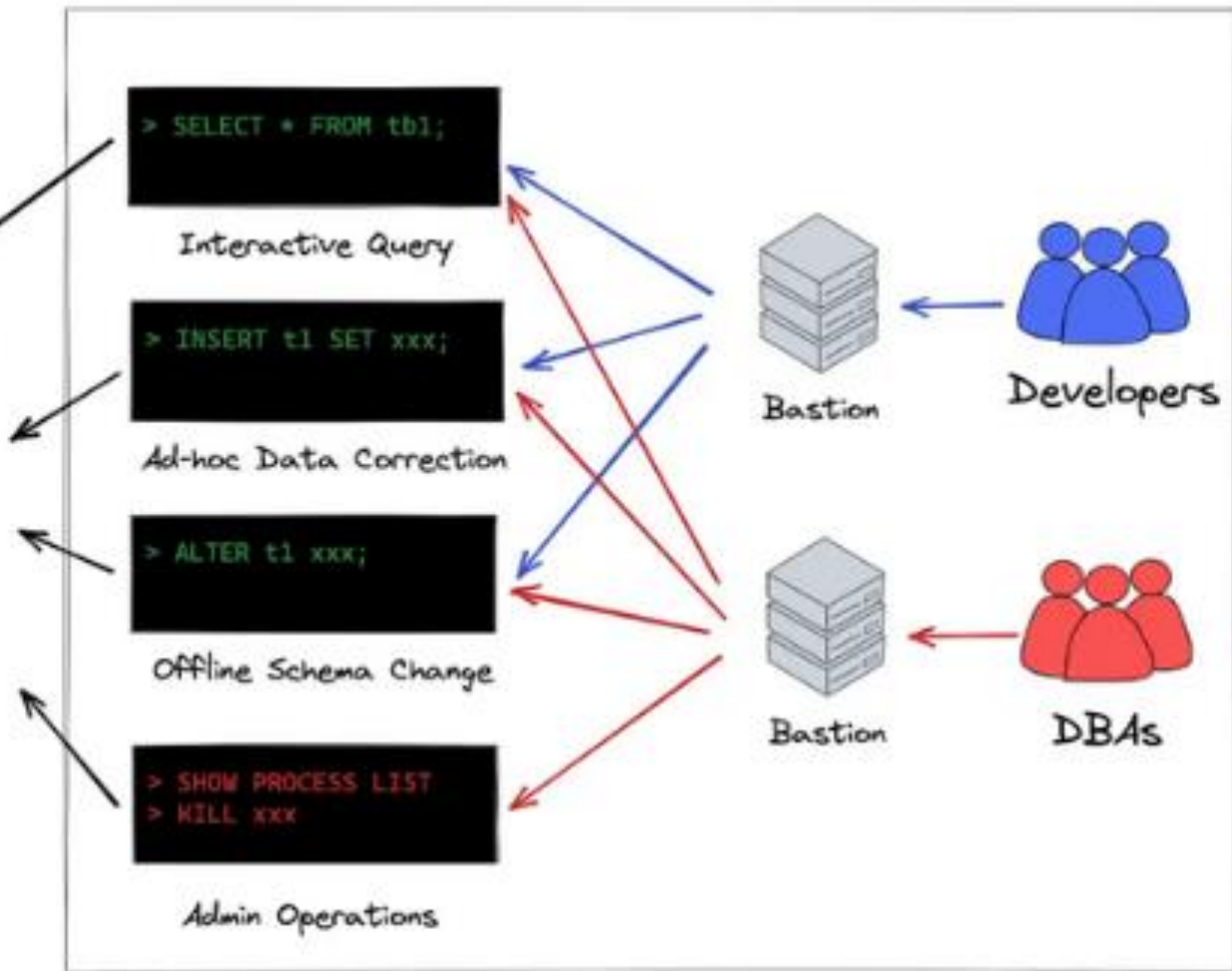
Un DBA peut imposer que tous les accès passent par des API PL/SQL contrôlées.



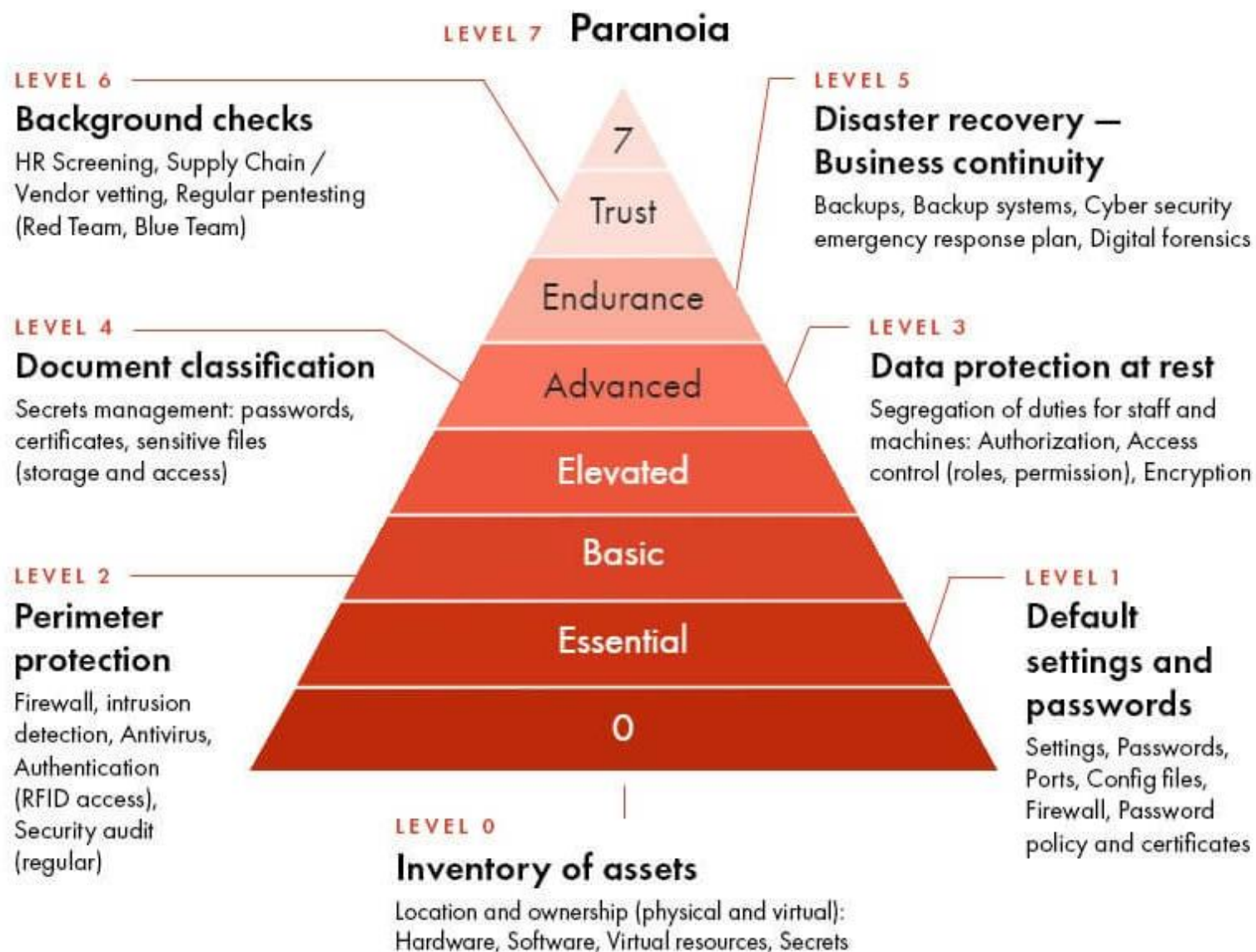
Machine to Database



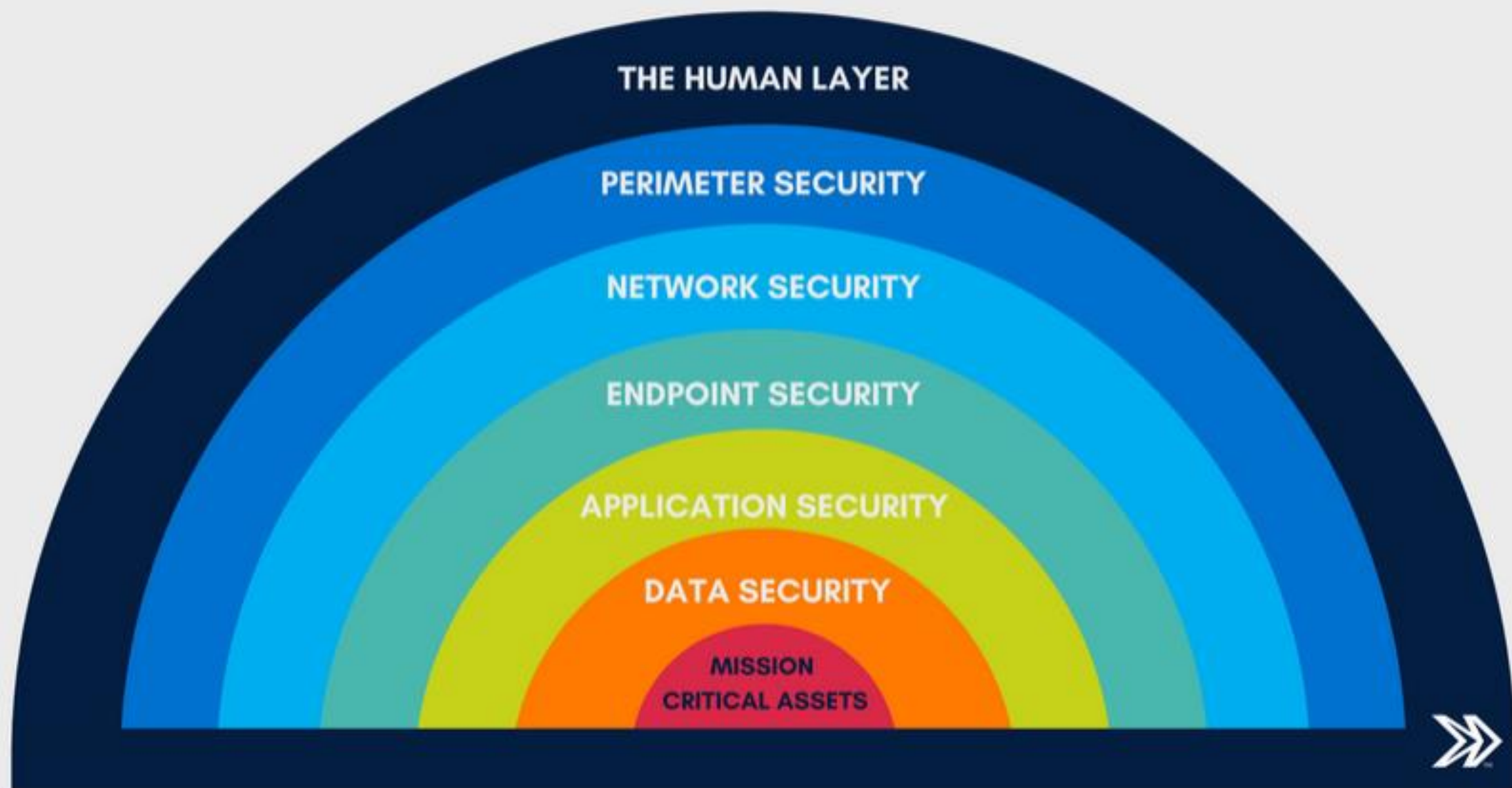
Human to Database



Enterprise Security Pyramid



THE 7 LAYERS OF CYBERSECURITY



PL/SQL et diagnostic avancé

PL/SQL permet de créer des outils de diagnostic internes.

Outil PL/SQL

Usage DBA

DBMS_OUTPUT

Debug

DBMS_PROFILER

Analyse performance code

DBMS_APPLICATION_INFO

Tracer sessions

Logs personnalisés

Historique incidents

Un DBA avancé utilise PL/SQL pour instrumenter la base.

