# DB server limits (process/sessions)

Carlos Fernando Gamboa, BNL
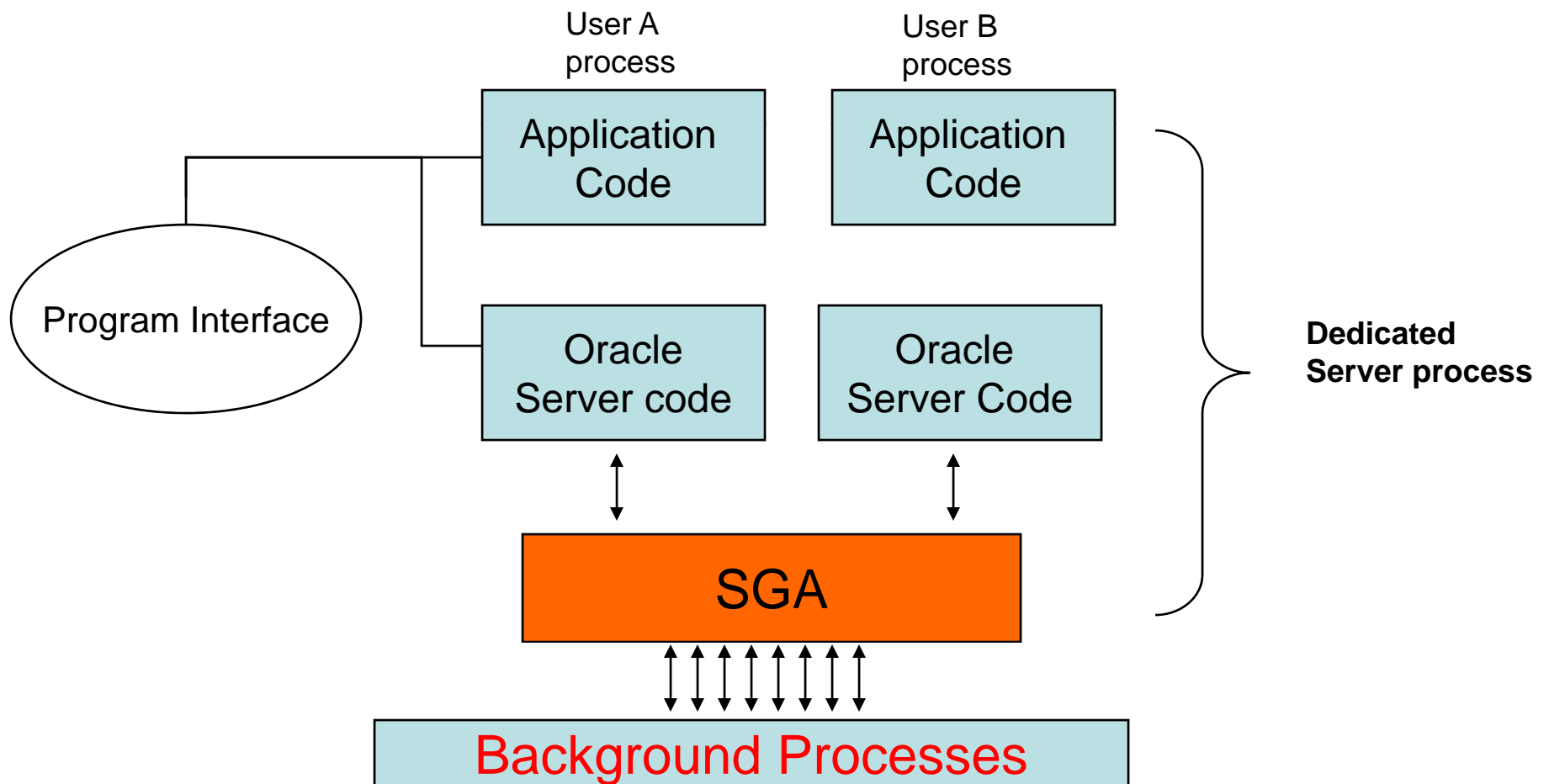
Andrew Wong, TRIUMF

# DB server limits (process/sessions)
## -table of contents-

- Overview database resource limits

- Overview database profiles

- Implementation BNL and TRIUMF

- Conclusion

# DB server limits (process/sessions)

## -Dedicated server general process database diagram-

# DB server limits (process/sessions)
## -relevant definitions-

Some definitions.

**Process:** Is a mechanism in an operating system that can run a series of instructions and has a private memory area in which it runs (Program Global Area).

**Session**: Is a specific connection of a user to an Oracle Database instance through a user process.

**Connection**: Is a communication pathway between a user process and an Oracle Database instance.

# DB server limits (process/sessions)
## -relevant server parameters-

**Server parameter on oracle**

**Processes parameter:**
Defines the maximum process an oracle instance can use at the same time.
(No dynamic parameter)

**pga_aggregate_target parameter:**
Specifies the target aggregate PGA memory available to all server
processes attached to the instance

**Sessions parameter:**
Define number of session the an oracle instance can establish at the
same time. When this parameter is not specifically defined in the parameter
file, oracle assigns  (1.1*process + 8) sessions.

# DB server limits (process/sessions)
## -Resource limits-

**Resource limits**

Mechanism implemented by Oracle to prevent uncontrolled use of system resource.

Resources can be controlled at session, call or CPU level.

This presentation will focus on process and session resources.

# DB server limits (process/sessions)
## -Resource limits-

Resources can be limited via different parameters such as:

- **Concurrent sessions per user:**
  Limits the number of sessions a user can establish at the same time.

- **Idle time for a session**
  When the session reaches the maximum idle time limit:
  1. The current transaction is rolled back.
  2. The session is aborted. Resources are returned to the system.
  3. Next call receives an error that indicates the user is no longer connected to the instance.
  4. PMON (Process Monitor) background process cleans up after the session is aborted. Until the session is still counted in any session/user resource limit.

# DB server limits (process/sessions)
## -Resource limits-

- **Session limit**

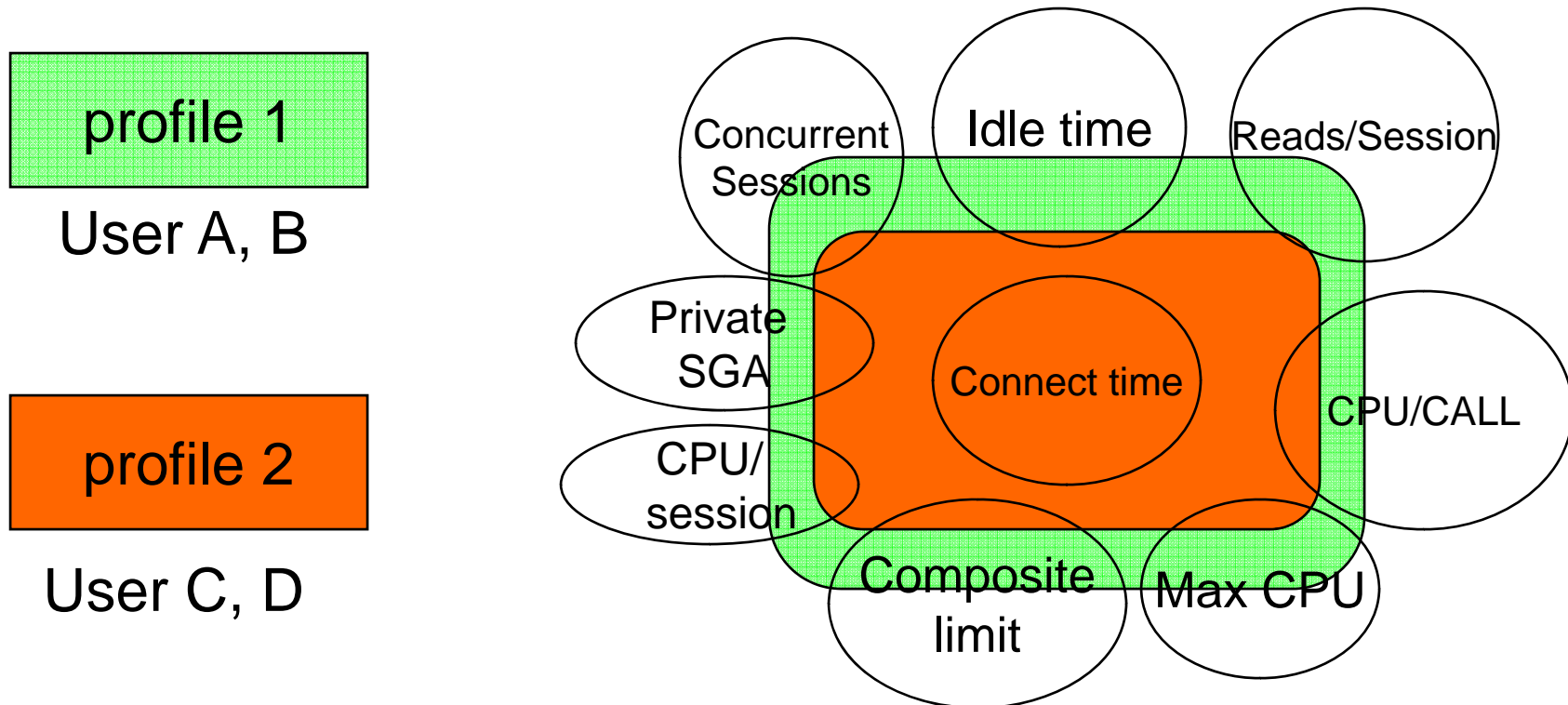  When a user exceeds resource limit:
  - The current statement is terminated (roll back).
  - Three operations allowed (commit, rollback, disconnect).
  - A message indicating that the session limit has been reached is sent.

- **CPU resource Time**

  Limits the CPU time for each call and the total amount of CPU time used for Oracle calls during a session.

# DB server limits (process/sessions)
## -database profiles-

Database profiles: The goal is to limit the amount of database resources a user can get access to.

profile 1

User A, B

profile 2

User C, D

Concurrent Sessions

Idle time

Reads/Session

Private SGA

Connect time

CPU/CALL

CPU/ session

Composite limit

Max CPU

# DB server limits (process/sessions) -profiles implementation-

**BNL 3D Cluster 2 nodes RAC**

Node description:

- 2 dual core 3GHz, 64 bits Architecture  (recently upgraded).

- 2GB SGA, 16GB RAM (recently upgraded).

- Storage :

SAS storage array Hardware RAID controller.

24 disks to ASM.

Served over FC connections.


**TRIUMF 3D 2 nodes RAC**

Node description:

-1 dual-core CPU, 1.6 GHz.

-4 GB RAM, 2GB SGA  --> memory will be upgrade to 10GB.

-64-bit architecture.

 Storage:   SATA storage array.

9 disks to ASM.

Served over FC connections.

# DB server limits (process/sessions)
## -profiles implementation-

Default profile: is used when a user is not explicitly assigned a profile or when a limit of any profile is unspecified.

Create the profile.

```
EXAMPLE
CERN APP PROFILE (3D Conditions database)
Application profile-- To be given to application reader and
writer accounts

CREATE PROFILE cern_app_profile LIMIT
FAILED_LOGIN_ATTEMPTS 10
PASSWORD_LOCK_TIME 1/1440
PASSWORD_LIFE_TIME UNLIMITED
SESSIONS_PER_USER 7000
IDLE TIME  240;
```

# DB server limits (process/sessions)
## -profiles implementation-

2.  Enforce limits through pfile parameter
    resource_limit = TRUE

3.  Tune up the limits based on cluster database resources, user/application access pattern. Every resource limit enforced needs to be setup carefully.

**Concurrent session per user:**

Depends on initialization server parameter session.

Session parameter :

    - In a dedicated server each session connects to a specific database process.

    - Make sure this parameter is smaller than the session server parameter. Leave enough slots for database process and sys operations.

| Example:   **BNL** | **TRIUMF** |
|---|---|
| Concurrent sessions per user=3500 | Concurrent sessions per user=600 |
| SESSIONS=6605 | SESSION= 885 |
| PROCESS=6000 | PROCESS=800 |
| pga_aggregate_target=3.23GB | pga_aggregate_target=1GB |

# DB server limits (process/sessions)
## -profiles implementation-

**MAX IDLE TIME:**

-Like the other parameters depends on the application access pattern to the database.

Example:

**BNL**
Max idle time = 4 hours

**TRIUMF**
Max idle time = 30 minutes

## Sniped sessions:

Sessions that timed out but were not cleaned properly.
To clean up the OS system it was necessary to implement a script to find sessions marked as sniped and then kill the OS processes associated with them.

# DB server limits (process/sessions)
# -snipe sessions-

Example
BNL and TRIUMF implemented the scrip every hour.

Instructions to implement the clean up script can be
found in:

https://twiki.cern.ch/twiki/bin/view/PSSGroup/KillingSnipedSession

Thanks to Dawid Wocjik for providing this script.

# DB server limits (process/sessions)

On M5 recent reconstruction test at BNL conditions database demonstrated that could sustain 1900 sessions concurrently without affecting the normal operation of database and stream replication process.

# DB server limits (process/sessions) - Conclusion -

- Overview to resource limits and profiles was presented.

- Appropriate user profile benefits the overall database performance.

# Bibliography

**Oracle Database 10g Real Application Clusters Handbook,** McGraw Hill Osborne Media; 1 edition (November 22, 2006)

**Online documentation**

### Oracle database concepts 10.2
http://download.oracle.com/docs/cd/B19306_01/server.102/b14220/toc.htm

### 3D Twiki documentation
https://twiki.cern.ch/twiki/bin/view/PSSGroupStreamsConfigurationChecklist
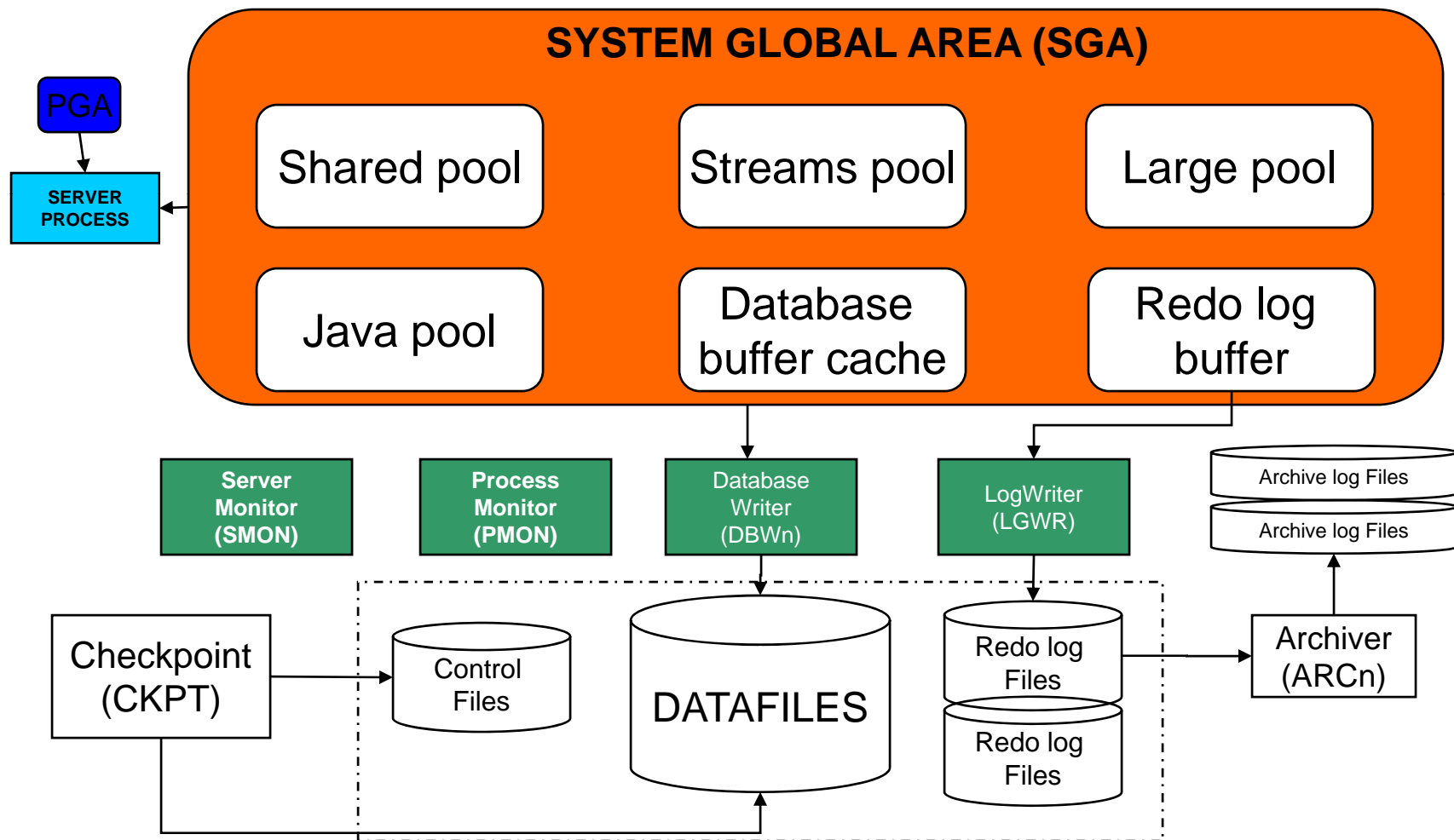
# Acknowledgements

Many thanks to:

- CERN IT PSS GROUP
- Atlas DBAs PH/ATP-CO Group

# BACKUP SLIDES

# Oracle single instance manager

# Oracle cluster architecture

Node1

Node 2

Cluster Manager

SGA

High Speed Interconnect

SGA

LogWriter (LGWR)

Database Writer (DBWn)

GLOBAL CACHE SERVICE (GCS)

GLOBAL CACHE SERVICE (GCS)

Database Writer (DBWn)

LogWriter (LGWR)

Redo log Files

Redo log Files

DATAFILES

Redo log Files

Redo log Files