Using Resource Manager with CDB and PDBs

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Objectives

By the end of this lecture, you should be able to:

- Describe the difference between using the Resource Manager in a CDB container and a non-CDB database.
- Use the Resource Manager to manage allocating the resources to the PDBs

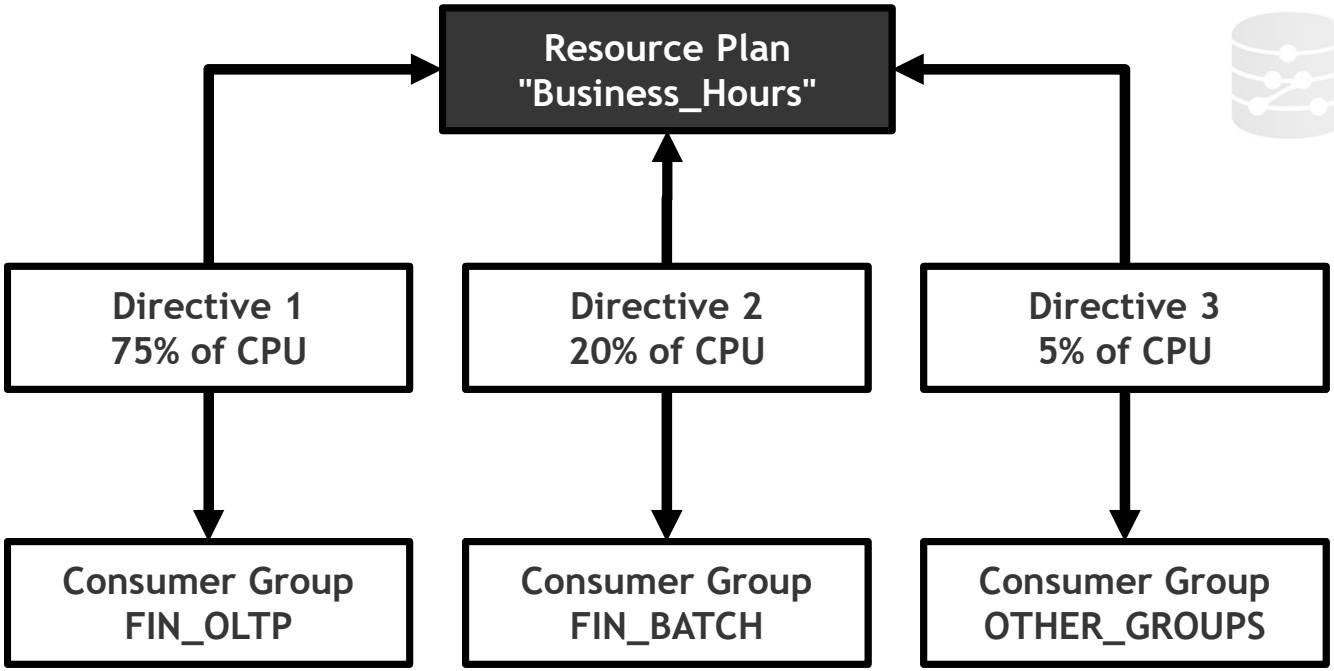
About Resource Manager

- Manage the hardware resources allocated to the PDBs
- With Resource Manager you can:
  - Distribute CPU time among the users and applications
  - Limit the amount of PGA memory
  - Limit degree of parallelism
  - Set priorities of parallel statements
  - Limit the number of parallel execution servers
  - Create an active session pool
  - Limit session idle time
  - Prevent executing long time operations

Resource Manager Elements

Element	Description
Resource consumer group	A group of sessions that are grouped together based on resource requirements.
Resource plan	Specifies how the resources are allocated to resource consumer groups.
Resource plan directive	Associates a resource consumer group with a particular plan and specifies how resources are to be allocated to that resource consumer group.

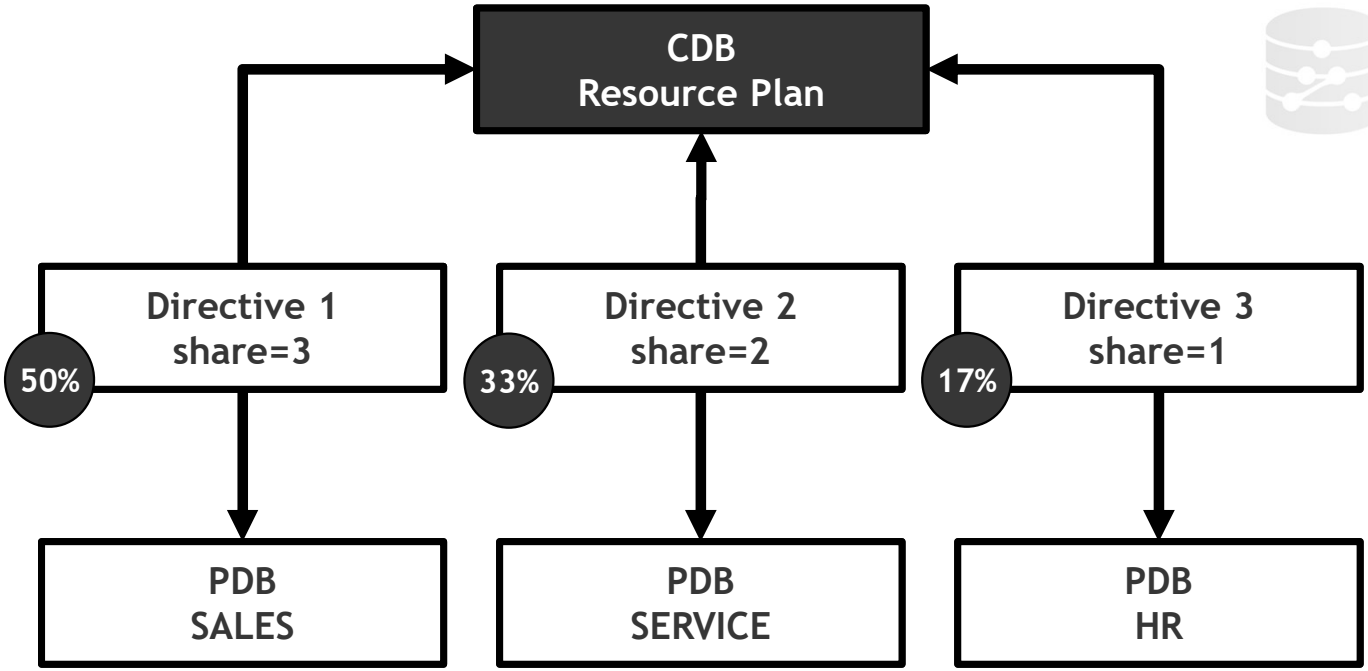
Resource Plan Example



Managing Resources at the CDB Level and PDB Level

- Resource Manager manages resources on two basic levels:
  - CDB Level
  - PDB Level
- Directives in a CDB resource plan references one of the following:
  - A single PDB
  - A set of PDBs in a PDB performance profile
- The directives control allocation of:
  - CPU time
  - Parallel execution servers

Shares for Allocating Resources to PDBs



Utilization Limits for PDBs

Resource	Parameter	Description
CPU	**UTILIZATION_LIMIT**	the CPU utilization for the PDB cannot exceed the utilization limit.
	CPU_COUNT	The PDB cannot use more than the specified CPUs at any time
Parallel execution servers	**PARALLEL_SERVERS_TARGET * PARALLEL_SERVER_LIMIT**	Parallel queries are queued if the number of parallel execution servers used by the PDB would exceed PARALLEL_SERVERS_TARGET * PARALLEL_SERVER_LIMIT parameter.

Creating a CDB Resource Plan for Individual PDBs

1. Create the pending area
2. Create a resource plan
3. Create directives for the PDBs
4. (Optional) Update the default PDB directive
5. (Optional) Update the default autotask directive
6. Validate the pending area
7. Submit the pending area

CDB Resource Plan for Individual PDBs Example

PDB	Shares Directive	UTILIZATION_LIMIT Directive
PDB1	3	Unlimited
PDB2	3	Unlimited
PDB3	2	70
Default	1	50
Autotask	1	50

(1) Create the pending area

```
Begin
 DBMS_RESOURCE_MANAGER.CREATE_PENDING_AREA();
End;
/
```

(2) Create a Resource Plan

```
BEGIN
 DBMS_RESOURCE_MANAGER.CREATE_CDB_PLAN(
  PLAN => 'CDB_RPLAN',
  COMMENT => 'CDB resource plan for the PDBs');
END;
/
```

(3) Create directives for the PDBs

```
BEGIN
DBMS_RESOURCE_MANAGER.CREATE_CDB_PLAN_DIRECTIVE(
  PLAN => 'CDB_RPLAN',
  PLUGGABLE_DATABASE => 'PDB1',
  SHARES => 3,
  UTILIZATION_LIMIT => 100);
END;
/

...
```

(4) Update the Default PDB Directive

```
BEGIN
DBMS_RESOURCE_MANAGER.UPDATE_CDB_DEFAULT_DIRECTIVE(
 PLAN => 'CDB_RPLAN',
 NEW_SHARES => 1,
 NEW_UTILIZATION_LIMIT => 50
 );
END;
/
```

(5) Update the autotask Directive

```
BEGIN
DBMS_RESOURCE_MANAGER.UPDATE_CDB_AUTOTASK_DIRECTIVE(
 PLAN => 'CDB_RPLAN',
 NEW_SHARES => 1,
 NEW_UTILIZATION_LIMIT => 50
 );
END;
/
```

(6) Validate the Pending Area

```
BEGIN
 DBMS_RESOURCE_MANAGER.VALIDATE_PENDING_AREA
END;
/
```

(7) Submit the pending area

```
BEGIN
 DBMS_RESOURCE_MANAGER.SUBMIT_PENDING_AREA
END;
/
```

Enabling and Disabling a CDB Resource Plan

- To enable a CDB Resource Plan:
  1. Connect to the root
  2. Set the parameter:

```
ALTER SYSTEM SET RESOURCE_MANAGER_PLAN = 'CDB_RPLAN';
```

- To disable a CDB Resource Plan:
  1. Connect to the root
  2. Reset the parameter:

```
ALTER SYSTEM SET RESOURCE_MANAGER_PLAN = '';
```

Associating a CDB plan to Scheduler Window

```
BEGIN
   DBMS_SCHEDULER.CREATE_WINDOW(
       window_name    => 'daytime',
       resource_plan  => 'CDB_RPLAN',
       start_date     => '05-Jan-01 8:00:00 AM',
       repeat_interval=> 'freq=daily',
       duration       => interval '8' hour);
END;
```

When a CDB and a PDB Resource Plans in Action

CDB Resource Plan

PDB	Shares	Utilization Limit
PDB1	2	100%
PDB2	1	50%
PDB3	1	50%

PDB1 Resource Plan

Consumer Group	Shares	Utilization Limit
OLTP	3	100%
BI	1	75%
OTHER	1	50%

Resources allocated to BI consumer group from the server resources:

- Guaranteed CPU time: 50% (2/4) x 20% (1/5) = 10%
- CPU Time Limitation: 100% x 75% = 75%

Viewing Information About Plans and Directives in a CDB

View	Description
DBA_CDB_RSRC_PLANS	display all of the CDB resource plans
DBA_CDB_RSRC_PLAN_DIRECTIVES	display all of the directives defined in all of the CDB resource plans

```
SELECT PLAN, PLUGGABLE_DATABASE ,SHARES,
       UTILIZATION_LIMIT, PARALLEL_SERVER_LIMIT
FROM DBA_CDB_RSRC_PLAN_DIRECTIVES
ORDER BY PLAN;
```

Summary

In this lecture, you should have learnt how to:

- Describe the difference between using the Resource Manager in a CDB container and a non-CDB database.
- Use the Resource Manager to manage allocating the resources to the PDBs