

SMON

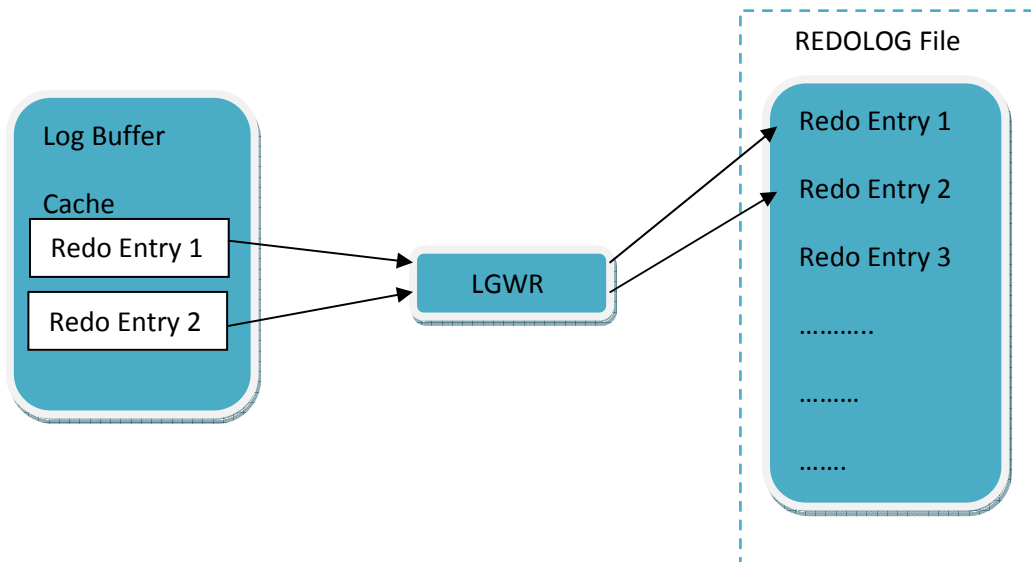
SMONn is one of the important processes in Database Architecture. The main work of SMONn is **Instance Recovery**

The Instance Recovery can be done by using three phases

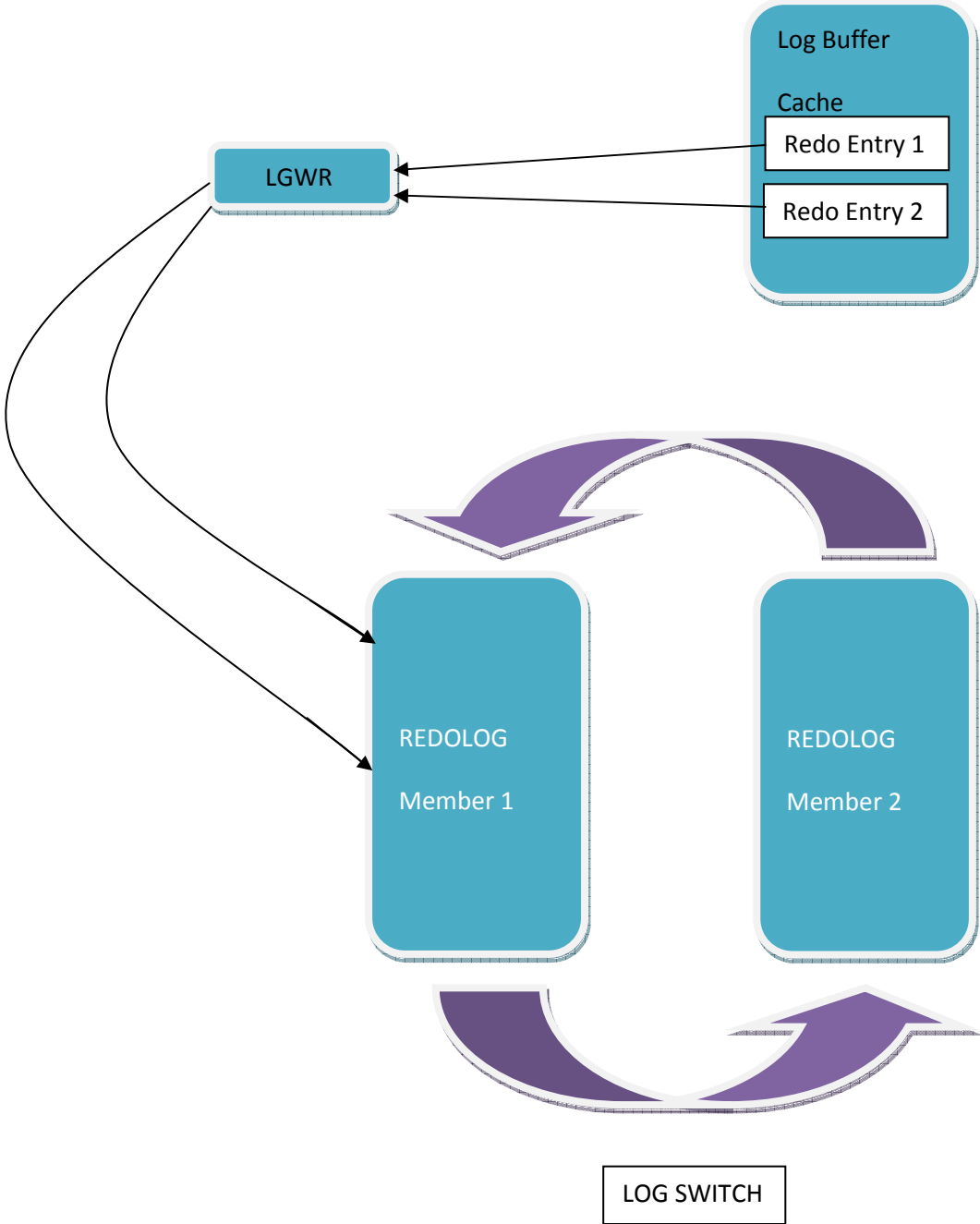
- Roll Forward
- Open the database to users
- Roll Backward

Let consider an example that a user “A” wants to transfer an amount of 1000 to another account names “B”. During this process a Instance Crash occurs (Power failure or RAM failure) at this situation the problem is solved by using Roll Forward/Roll Backward technique which is nothing but Instance Recovery.

Before going into the explanation of SMONn let’s see the concept of REDOLOG Files. Actually the REDOLOG files are loaded with **redo entries** by LGWR. It is in the form of single block as shown below



Here the Problem occurs if we load more no of **redo entries** into REDOLOG Files even TERA/PETA bytes of memory is also not sufficient. To Over Come this Problem Oracle came up with a better solution i.e, Using "2" REDOLOG members instead of "1"



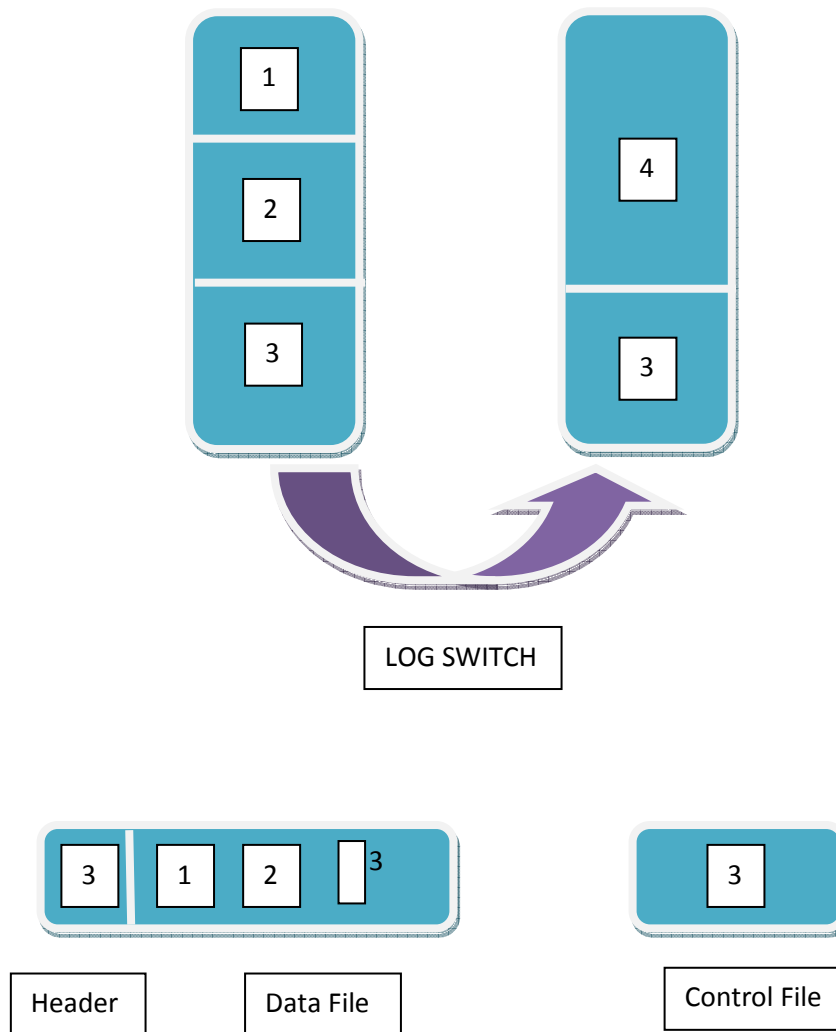
If first REDOLOG member is full then the redo entries are loaded in second REDOLOG member, while changing from 1st member to 2nd member a LOG SWITCH will occur, It will load the redo entries from REDOLOG member 1 to DATA FILES (After log switch only the redo entries are loaded into data files) based on some actions, they are

- **Check Point Event**-It's Action is committed data is loaded into the data files by DBWRn
- **CKPT Process** –It's Action is to update the SCN to data file header and control files
- **DBWRn** will write the dirty blocks in write list to data files
- **ARCHn Process** – It's work sis to load the redo entries of REDOLOG member 1 to ARCHn

If suppose a REDOLOG member 1 is full then a log switch is occurred then redo log member 2 is used for loading the redo entries, if again that REDOLOG member 2 is also full then it has to jump back to REDOLOG member 1(now the contents in the REDOLOG member 1 is Overloaded it is nothing but the data is going to lost) for this purpose ARCHn process is used It will Load the redo entries which are going to Overloaded

SMON Instance Recovery

Example 1 (ROLL FORWARD)



From the above example the 1,2,3,4 represents transactions. The transactions 1, 2, half of 3 are done in REDOLOG member 1, whereas REDOLOG member 2 consists of 3&4 transactions.

When REDOLOG member 1 is completed it has to jump to REDOLOG member2 before that LOG SWITCH will occur. As we discussed above when LOG SWITCH is occurred the 4 actions are performed those are nothing but the contents of **header, data file** and **control file**.

The SCN is loaded into Header, Control File and only Committed Transactions are Loaded into Data File

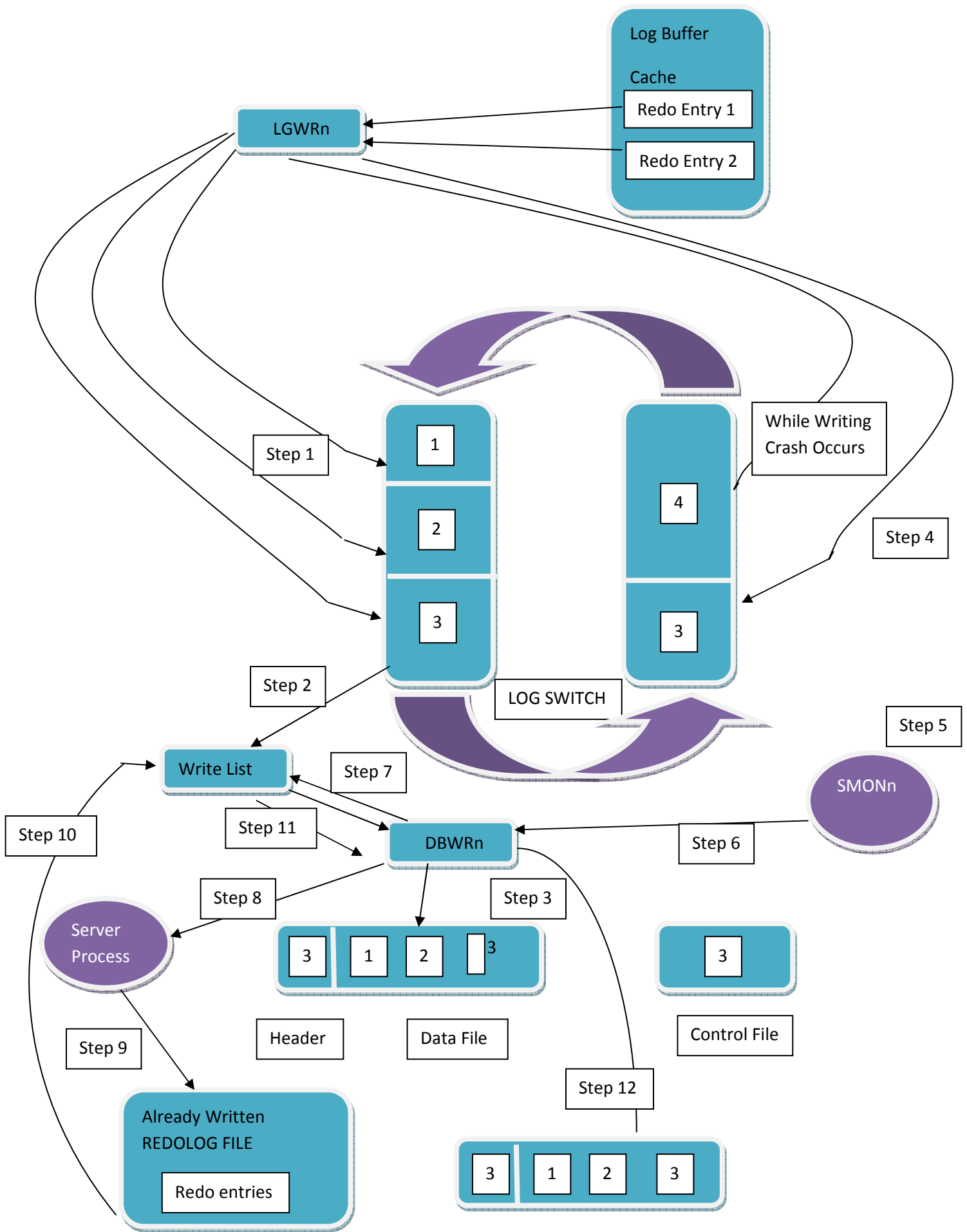
Here in this example 1,2 are committed where as 3 is also committed but only half of the transaction is written in Data File by DBWRn

Then in the REDOLOG member 2 the remaining process is going on and transaction 3 is committed,4th transaction is going on. Assume here LGWRn writing the transaction 4.Assume at that state an **Instance Occurs**

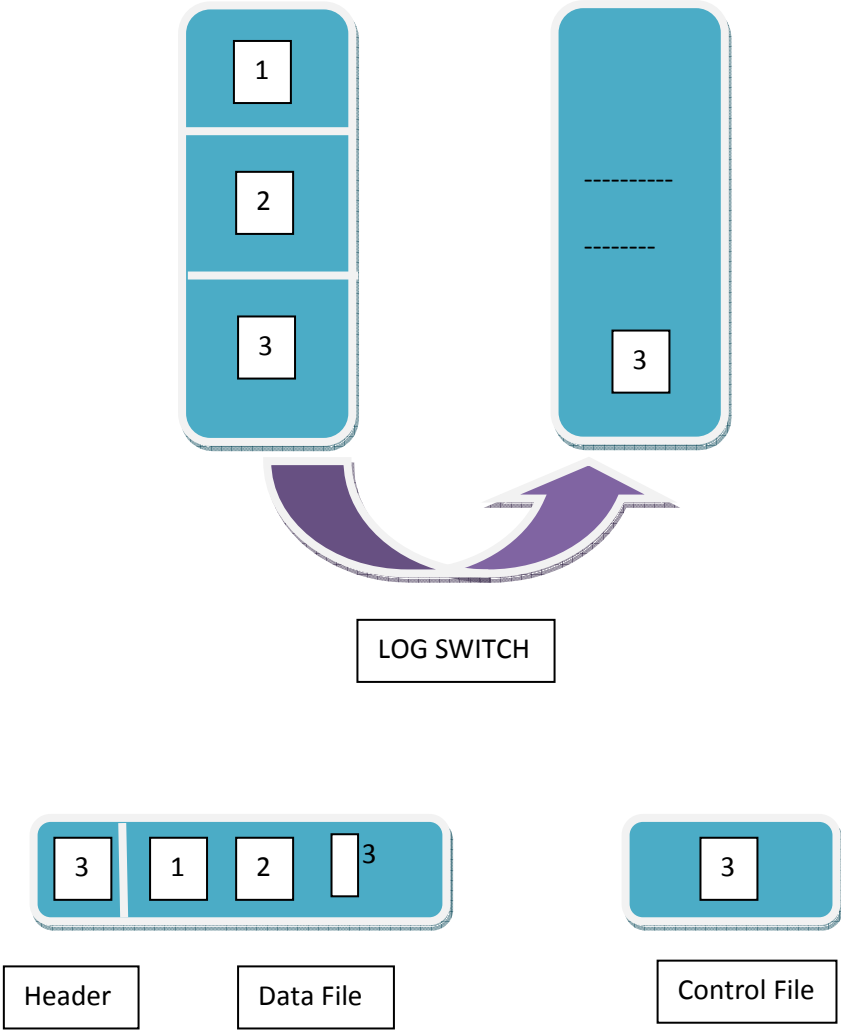
Whenever an instance Occurs SMONn Process will Woke up and start comparing SCN between Header of DATA FILE and REDOLOG file it also checks the check point

It will identify that 1, 2 are written into data files but not 3(which is half written) so SMON will initiate work to DBWRn. The DBWRn will check for dirty blocks in Write List because of instance crash nothing is there in Write list. Then DBWR will take help from Server Process where it will copy the dirty block (redo entries) from the REDOLOG Files

This is the process called as Roll Forward, here redo entries from redo log file are used to recover and committee the transaction



Example 2 (ROLL BACK)



Here in the above example transaction 3 is not committed. Due to log switch 1,2 and half of 3 is written into data files by DBWRn

Assume Instance Crash occurs while the LGWRn is writing the transaction3

When Instance Crash occurs SMONn will woke up and performs Instance Recovery

SMONn will start comparing SCN 1,2 when it comes to 3 it identifies that half of 3 is written so SMONn has to recover 3

Then SMON will assign task to DBWRn, as DBWRn will try for data in Write List because of Instance Crash it will ask help for Server Process

The Server Process will generated old values with the help of Undo Block

