

Bad file:

- **SQL*Loader rejects records when the input format is invalid.**
- **If the Oracle database finds that the row is invalid, then the record is rejected and SQL*Loader puts it in the bad file.**

Discard file:

- **This can be used only if it has been enabled.**
- **This file contains records that were filtered out because they did not match any record-selection criteria specified in the control file.**

Introduction to Database Administration

TOPIC 193

Log Files & Steps to adopt
Log Files & Steps to adopt

Log File Contents

Header Information
Global Information
Table Information
Data File Information
Table Load Information
Summary Statistics
Additional statistics for Direct path loads and multithreading Information
Log Files & Steps to adopt

Header Information

Date of the run

Software version number
Log Files & Steps to adopt

Global Information

Name of all input/ output file Echo of command-line arguments
Continuation character specification
Log Files & Steps to adopt

Table Information

Table Name Load Conditions
INSERT, APPEND or REPLACE specifications
Columns, length, data type and delimiter
Log Files & Steps to adopt

Data File Information

SQL*Loader and Oracle data record errors
Log Files & Steps to adopt

Table Load Information

Number of rows loaded, rejected, discarded, Null fields discarded
Log Files & Steps to adopt

Summary Statistics

Amount of space used for bind array Cumulative load statistics for data files,
skipped, read and rejected records
Log Files & Steps to adopt

Additional statistics for Direct path loads and multithreading Information

Direct path load of a partitioned table reports per-partition statistics
Conventional-path load cannot report per- partition statistics
Introduction to Database Administration

TOPIC 194

Sample Example to Load Data-1

Sample Example to Load Data-1

Example's Contents

Data Loading

Data Migration – From File to Database

Example of Data Loading

Sample Example to Load Data-1

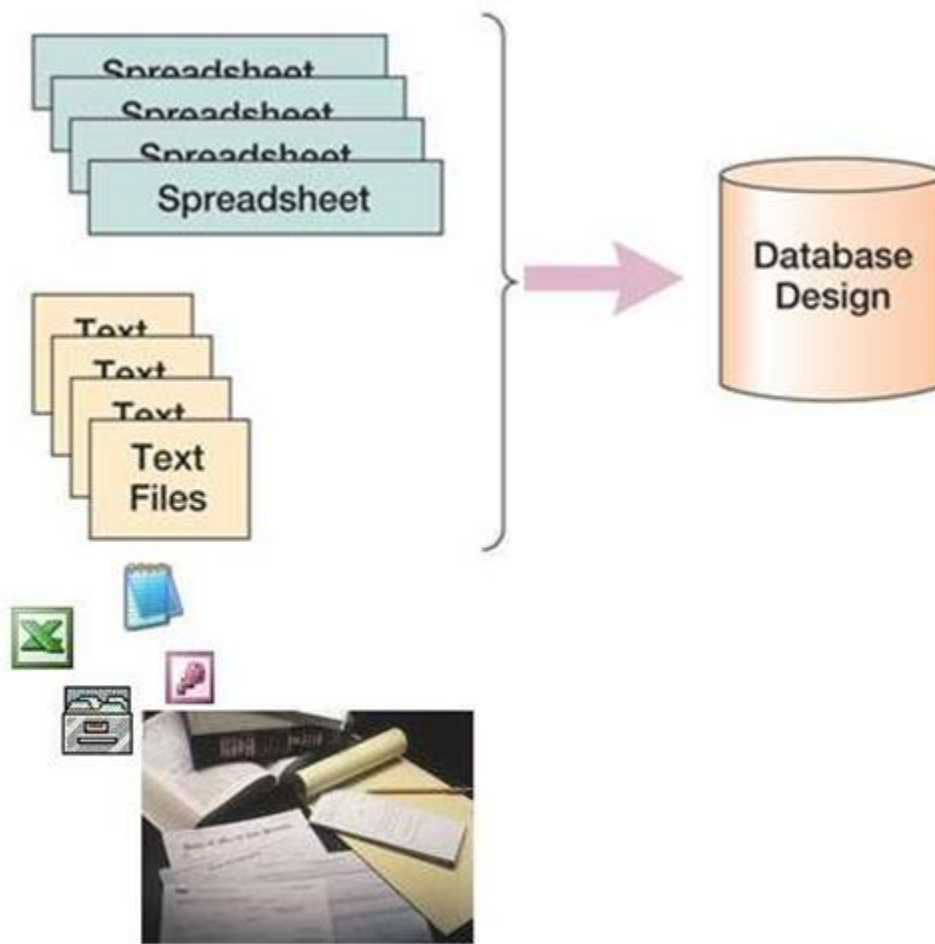
Data Loading

Loading data from files

Files can be comma delimited Files can be in XML format Binary files (Oracle to Oracle)

Sample Example to Load Data-1

Data Migration – Files to Database



Sample Example to Load Data-1

```

Login scott
create table TEMP_EMP
(Empno Number(4),
Ename VARCHAR2(50),
Salary Number(8)
);

c:\test\control.ctl
load data
infile 'c:\test\DBA-EXP-194.csv'
truncate
into table scott.temp_emp
fields terminated by ','
(empno, ename, salary)

cd E:\app\Haider\product\11.2.0\dbhome_1\BIN
c:\test>sqlldr control=c:\test\control.ctl
|data=c:\test\DBA-EXP-194.csv log=c:\test\ulcase2.log

```

Example of Data Loading

Sample Example to Load Data-1

Example of Data Loading

```

E:\app\Haider\product\11.2.0\dbhome_1\BIN>sqlldr control=c:\test\control.ctl
data=c:\test\DBA-EXP-194.csv log=c:\test\ulcase2.log
Username:scott
Password:
SQL*Loader: Release 11.2.0.1.0 - Production on Wed Nov 4 19:13:30 2020

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Commit point reached - logical record count 6

E:\app\Haider\product\11.2.0\dbhome_1\BIN>

```

Sample Example to Load Data-1

Example of Data Loading

```
SQL> create table TEMP_EMP
  2  (Empno Number(4),
  3  Ename VARCHAR2(50),
  4  Salary Number(8)
  5  );
```

Table created.

```
SQL> select * from temp_emp;
```

EMPNO	ENAME	SALARY
1001	Ejaz	5000
1002	Ali	3500
1003	Qadeer	3400
1004	Yaseen	4000
1005	Asim	3400

Sample Example to Load Data-1

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Introduction to Database Administration

TOPIC 195

Sample Example to Load Data-2

Sample Example to Load Data-2

Example's Contents

Material's Data Loading

Data Migration - Files to Database

Reasons to Load Data into TEMP_Material

Required Files Data Loading of Material

Data Loading Files with Contents

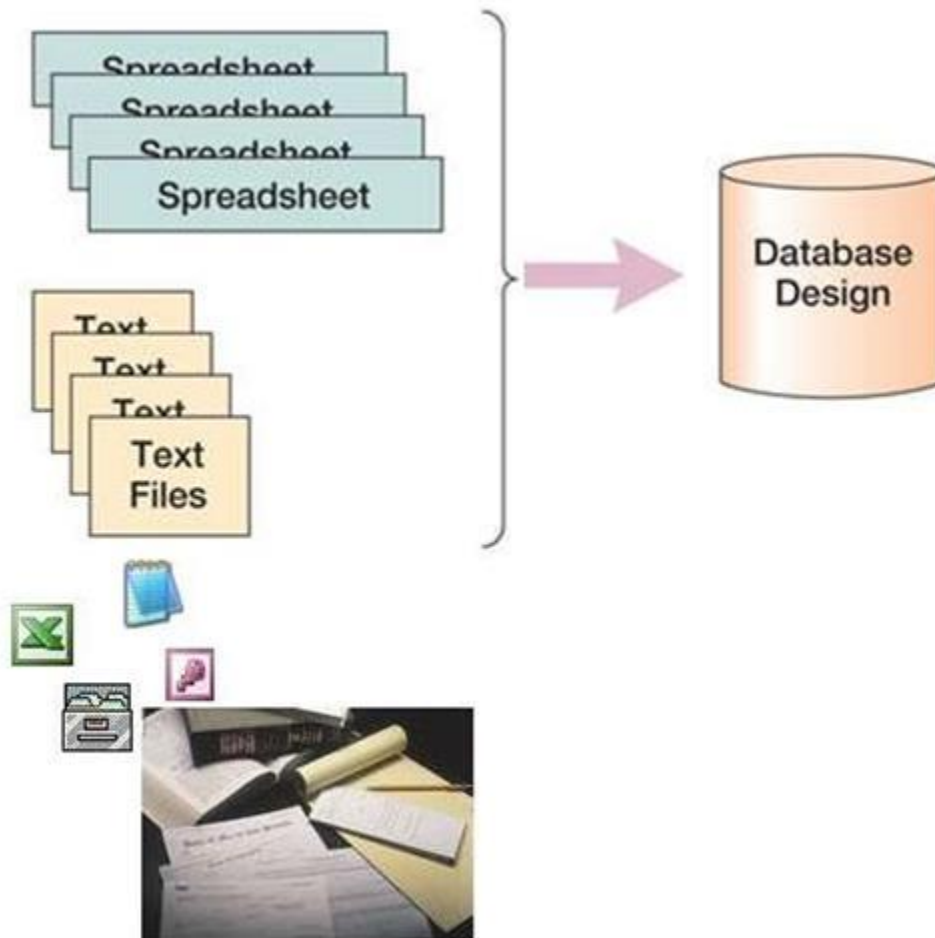
Sample Example to Load Data-2

Material's Data Loading

Data is comma delaminated regarding material or products

Need to load into table Material via
TMP_Material
Sample Example to Load Data-2

Data Migration – Files to Database



Sample Example to Load Data-2

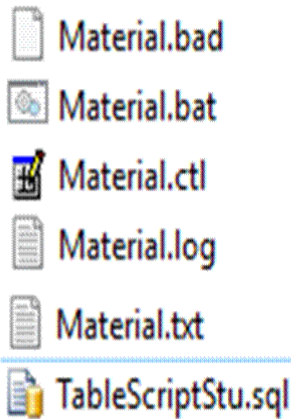
Reasons to Load Data into TEMP_Material

Try to avoid to load data into bad files Format of data
For example \$ symbol is given with numeric currency column

Size of column may less in the target table

Sample Example to Load Data-2

Required Files Data Loading of Material



```
Material.bat - Notepad
File Edit Format View Help
SQLLDR user/password CONTROL=c:\test\Material.ctl LOG=c:\test\Material.log BAD=c:\test\
\Material.bad DATA=c:\test\Material.txt
```

Sample Example to Load Data-2

Data Loading Files with Contents

Material.bad	13/02/2003 8:55 PM	BAD File	1 KB
Material.bat	24/10/2003 7:29 PM	Windows Batch File	1 KB
Material.ctl	26/09/2002 3:16 PM	Visual Basic User ...	1 KB
Material.log	13/02/2003 8:55 PM	Text Document	3 KB
Material.txt	26/09/2002 3:13 PM	Text Document	3,807 KB


```
Material.bat - Notepad
File Edit Format View Help
SQLLDR user/password CONTROL=c:\test\Material.ctl
LOG=c:\test\Material.log BAD=c:\test
\Material.bad DATA=c:\test\Material.txt
```

Sample Example to Load Data-2

Material.bad	13/02/2003 8:55 PM	BAD File	1 KB
Material.bat	24/10/2003 7:29 PM	Windows Batch File	1 KB
Material.ctl	26/09/2002 3:16 PM	Visual Basic User ...	1 KB
Material.log	13/02/2003 8:55 PM	Text Document	3 KB
Material.txt	26/09/2002 3:13 PM	Text Document	3,807 KB
TableScriptStu.sql	24/10/2003 7:30 PM	Microsoft SQL Ser...	1 KB

Material.ctl - Notepad

File Edit Format View Help

```
LOAD DATA
REPLACE INTO TABLE TMP_Material
FIELDS TERMINATED BY ','
OPTIONALLY ENCLOSED BY '"'
(BDSKU ,
BDDescrip ,
BDUPC ,
BDMainProdGrp ,
BDProdGroup ,
BDSubProdGrp ,
BDDivision ,
BDSysCost ,
BDBasePrice ,
BDCurrentInv ,
BDSalesStatus ,
Remarks )
```

Data Loading Files with Contents

Sample Example to Load Data-2

Data Loading Files with Contents

Material.bad	13/02/2003 8:55 PM	BAD File	1 KB
Material.bat	24/10/2003 7:29 PM	Windows Batch File	1 KB
Material.ctl	26/09/2002 3:16 PM	Visual Basic User ...	1 KB
Material.log	13/02/2003 8:55 PM	Text Document	3 KB
Material.txt	26/09/2002 3:13 PM	Text Document	3,807 KB
TableScriptStu.sql	24/10/2003 7:30 PM	Microsoft SQL Ser...	1 KB

Material.txt - Notepad

File Edit Format View Help

```
" BA-075", " SIDE DISCHARGE GRASS BAG", " 028877323220", "46610",
$32.47,$0.00,,, "Old"
" DW368",,,,,,$0.00,$0.00,,, "New"
"1", "7 1/4 BULK 40TH CARIBIDE SAW BLADE", "0", "0", "0", 30, $0.00, $0.00, 0
"1.00E-01", "LIDTY STAPLE GUN", "10000", "38000", "60400001", 30, $0.01, $0.0
"1.00E-07", "HAND STAPLE GUN CASE CUT", "030007040006", "0", "0", "0", 30, $0
"100", "8X12 CARPENTER SQ", "02000", "51000", "44200000", 10, $1.88, $0.00, 0
"1000", "4SKU CAR SAW MERCH", "067607310000", "18000", "37000", "39300001",
"1000 E", "HAND STAPLE GUN", "030007040006", "0", "0", "0", 30, $0.00, $0.00
"1000 F", "HAND STAPLE GUN", "0", "0", "0", 30, $0.00, $0.00, 0, "0", "Old"

"1000/203", "OUR OWN PACK", "028874015470", "0", "0", "0", 30, $0.00, $0.00, 0,
"10000", "SANDPAPER PRE PACK", "067607410007", "18000", "37000", "39300001"
```

Sample Example to Load Data-2

Material.bad	13/02/2003 8:55 PM	BAD File	1 KB
Material.bat	24/10/2003 7:29 PM	Windows Batch File	1 KB
Material.ctl	26/09/2002 3:16 PM	Visual Basic User ...	1 KB
Material.log	13/02/2003 8:55 PM	Text Document	3 KB
Material.txt	26/09/2002 3:13 PM	Text Document	3,807 KB
TableScriptStu.sql	24/10/2003 7:30 PM	Microsoft SQL Ser...	1 KB

```
TableScriptStu.sql - Notepad
File Edit Format View Help
create table TMP_Material
(BDSKU          VARCHAR2(255),
BDDescrip      VARCHAR2(255),
BDUPC         VARCHAR2(255),
BDMainProdGrp VARCHAR2(255),
BDProdGroup   VARCHAR2(255),
BDSubProdGrp  VARCHAR2(255),
BDDivision    VARCHAR2(255),
BDSysCost     VARCHAR2(255),
BDBasePrice   VARCHAR2(255),
BDCurrentInv  VARCHAR2(255),
BDSalesStatus VARCHAR2(255),
Remarks      VARCHAR2(255)
);

create table Material
(BDSKU          VARCHAR2(15),
```

Data Loading Files with Contents

Sample Example to Load Data-2

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Introduction to Database Administration

TOPIC 196

Sample Example to Load Data-3

Sample Example to Load Data-3

Example's Contents

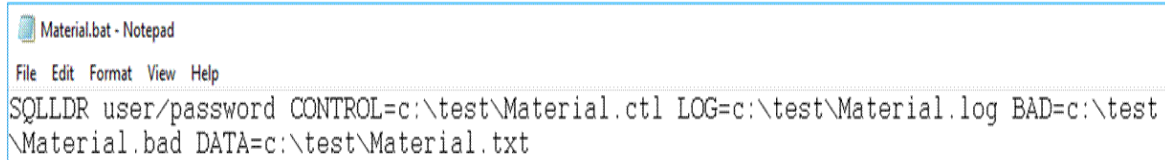
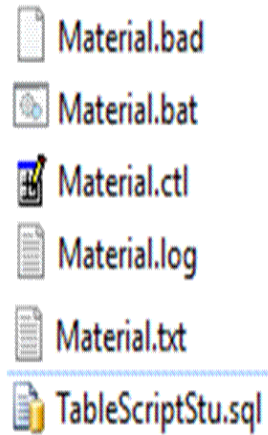
Executing Data Loading for Material (for Slide#195)

Data Migration - Files to Database

Sample Example to Load Data-3

Executing Data Loading for Material

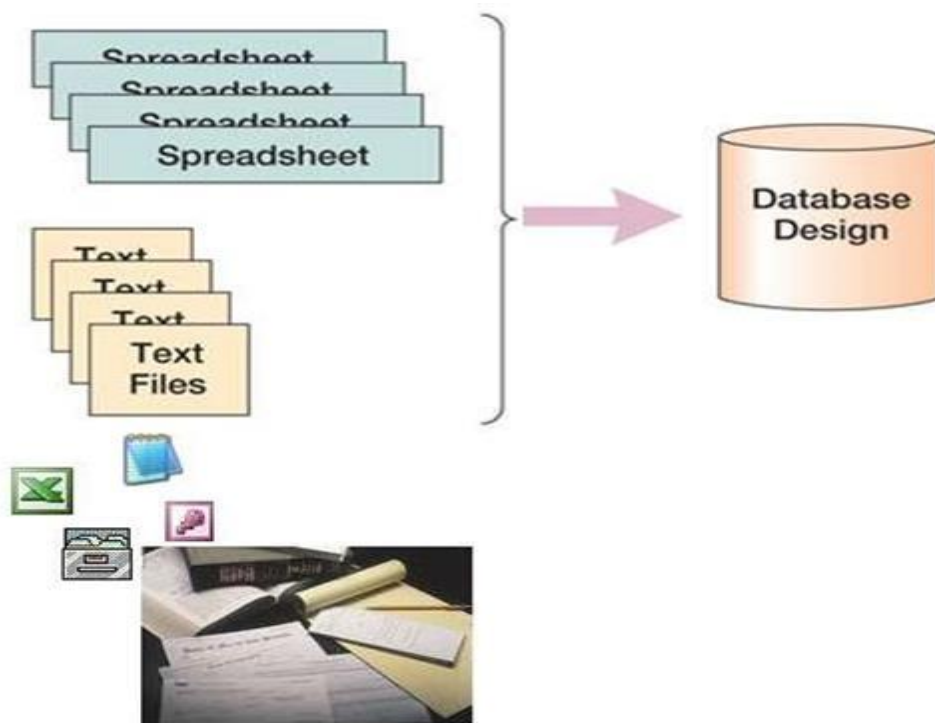
We will execute SQLLDR command to load data of material into scott's schema



```
Material.bat - Notepad
File Edit Format View Help
SQLLDR user/password CONTROL=c:\test\Material.ctl LOG=c:\test\Material.log BAD=c:\test
\Material.bad DATA=c:\test\Material.txt
```

Sample Example to Load Data-3

Data Migration – Files to Database



Sample Example to Load Data-3

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Introduction to Database Administration

TOPIC 197

Sample Example to Load Data-4

Sample Example to Load Data-4

Data Loading Tasks in Schema

Loading data from TEMP to actual Material Table

Tasks to load data from TEMP to actual Material Table

Sample Example to Load Data-4

Loading data from TEMP to actual Material Table

You have data in TMP_Material and you want to move or copy data into Material Table

Sample Example to Load Data-4

Tasks to load data from TEMP to actual Material Table

Use INSERT INTO ... SELECT command

Understand an error

See where data discrepancies are found

Run SQL UPDATE statements to fix discrepancies

Sample Example to Load Data-4

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Introduction to Database Administration

TOPIC 198

Sample Example to Load Data-5

Sample Example to Load Data-5

Data Loading Tasks using MS Access

Tasks to Connect MS Access & Oracle

Choosing MS Access by Connecting with Oracle Schema

Link Tables of MS Access & Oracle Schema

Sample Example to Load Data-5

Tasks to Connect MS Access & Oracle

Create ODBC data source of Oracle with use scott

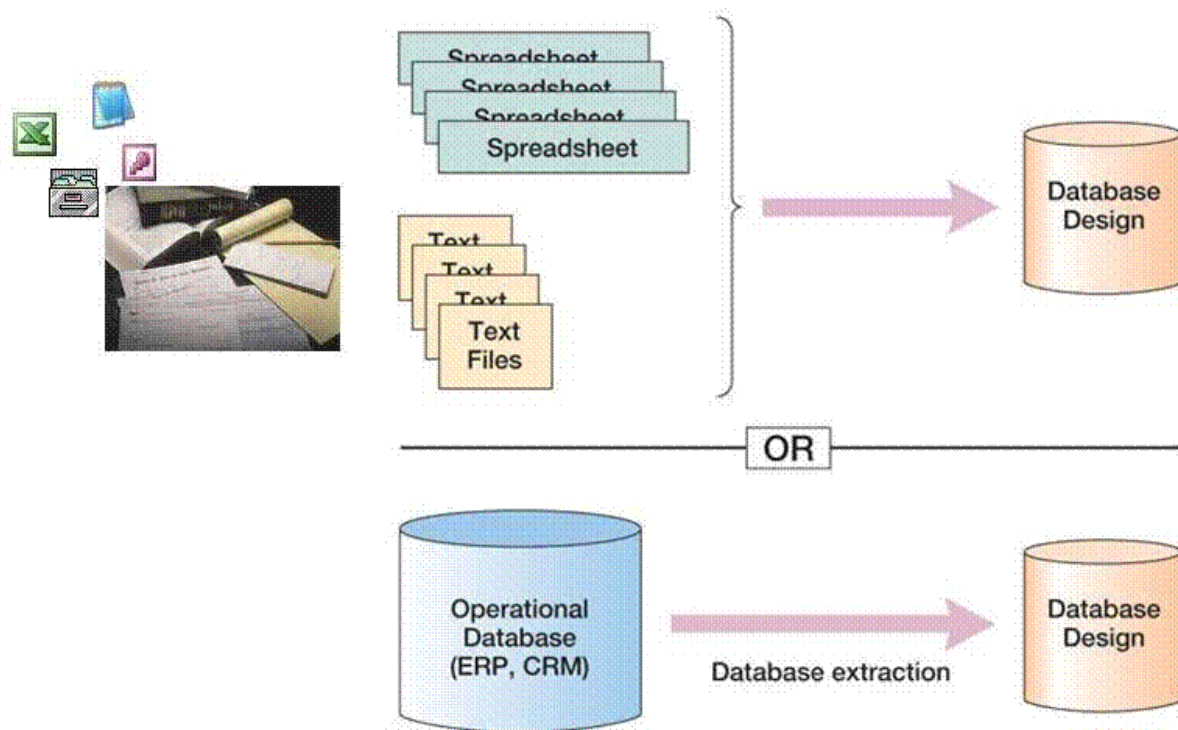
Open sample MS Access File and connect it with ODBC source user scott

Link or data import is possible in MS Access

Data can be inserted from MS Access into Oracle schema scott

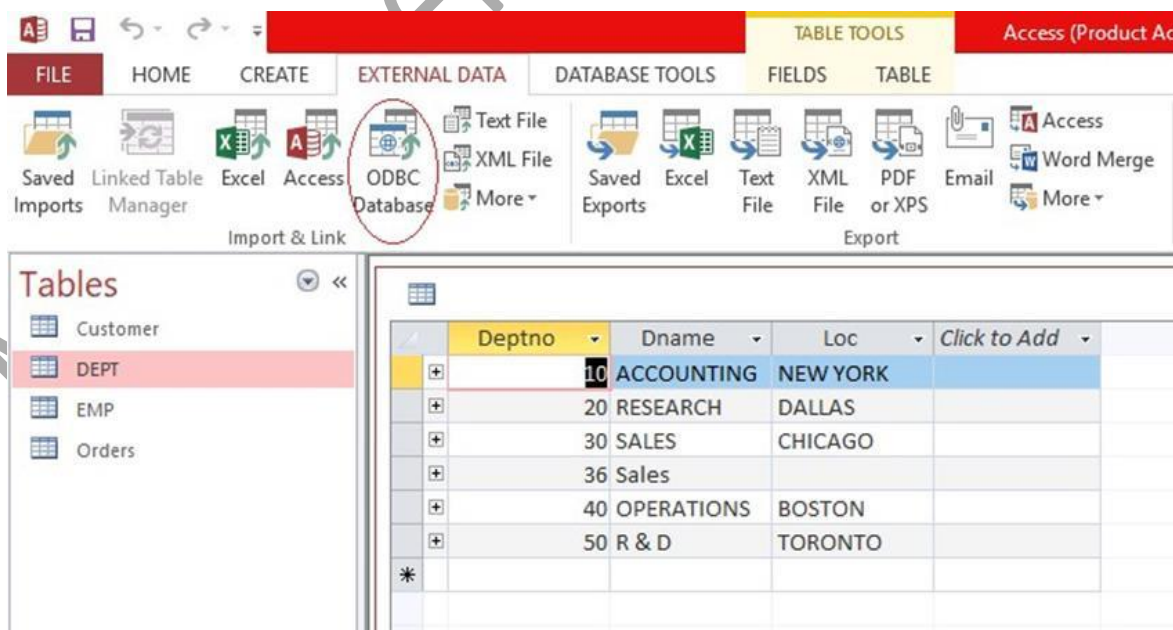
Sample Example to Load Data-5

Choosing MS Access by Connecting with Oracle Schema



Sample Example to Load Data-5

Link Tables of MS Access & Oracle Schema



Sample Example to Load Data-5

Link Tables of MS Access & Oracle Schema



LADDR	KADDR	SADDR	RADDR	LMODE	REQUEST	CTIME	BLOCK
...	...	...	...	1	0	56103	...
...	...	...	...	1	0	56103	...
...	...	...	...	2	0	56103	...
...	...	...	...	6	0	56088	...
...	...	...	...	2	0	56099	...
...	...	...	...	3	0	56088	...
...	...	...	...	6	0	56099	...
...	...	...	...	3	0	56088	...
...	...	...	...	4	0	56046	...
...	...	...	...	4	0	56085	...
...	...	...	...	4	0	56091	...
...	...	...	...	4	0	56091	...

Sample Example to Load Data-5

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TOPIC 199

Sample Example to Load Data-6

Sample Example to Load Data-6

Data Loading Tasks for Schema to Schema/ Files using Text Files

Preparing Spool File of Schema's Table using SQL

Data Load from Oracle Schema into Files

Sample Example to Load Data-6

Preparing Spool File of Schema's Table using SQL

In Scott schema

Spool c:\test\emp.txt

Select ... from EMP;

Spool off

Spool file contains comma

delaminated rows

File can be used to load data into any

DBMS

Sample Example to Load Data-6

Data Load from Oracle Schema into Files



Sample Example to Load Data-6

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Introduction to Database Administration

TOPIC 200

Sample Example to Load Data-7

Sample Example to Load Data-7

Data Preparation for Tasks using XML data

Preparing Spool File of Schema's Table using XML SQL

Sample SQL using XML Elements

Data Load from Oracle Schema into Files

Output Results of Sample XML SQLs

Sample Example to Load Data-7

Preparing Spool File of Schema's Table using XML SQL

In Scott schema

Spool c:\test\emp.txt

XML: Select ... from EMP;
Spool off
Spool file contains XML-taged rows
File can be used to load data into any DBMS
Sample Example to Load Data-7

Sample SQL using XML Elements

```
select xmlelement(name "emp", xmlelement(name "eno",empno), xmlelement(name "names",ename))
```

XML_output from emp

/

Sample Example to Load Data-7

Sample SQL using XML Elements

```
create table XML1 as select xmlelement("EMP",  
xmlelement("empno",e.empno), xmlelement("ename",e.ename), xmlelement("job", e.job),  
xmlelement("mgr", e.mgr), xmlelement("mgr1", e.mgr)) xml_desc  
from emp e  
where rownum<=1;
```

Sample Example to Load Data-7

Data Load from Oracle Schema into Files



Sample Example to Load Data-7

Output Results of Sample XML SQLs

```
SQL> select xmlelement(name "emp",
2          xmlelement(name "eno",empno),
3          xmlelement(name "names",ename)) XML_output
4 from emp
5 /
```

XML_OUTPUT

```
-----
<emp><eno>1234</eno><names></names></emp>
<emp><eno>8822</eno><names>ABC</names></emp>
<emp><eno>3513</eno><names>XYZ</names></emp>
<emp><eno>7369</eno><names>SMITH</names></emp>
<emp><eno>7499</eno><names>ALLEN</names></emp>
<emp><eno>7521</eno><names>WARD</names></emp>
<emp><eno>7566</eno><names>JONES</names></emp>
<emp><eno>7654</eno><names>MARTIN</names></emp>
<emp><eno>7698</eno><names>BLAKE</names></emp>
<emp><eno>7782</eno><names>CLARK</names></emp>
<emp><eno>7788</eno><names>SCOTT</names></emp>
```

```
SQL> create table XML1 as
2 select xmlelement("EMP",
3          xmlelement("empno",e.empno),
4          xmlelement("ename",e.ename),
5          xmlelement("job", e.job),
6          xmlelement("mgr", e.mgr),
7          xmlelement("mgr1", e.mgr)) xml_desc
8 from emp e
9 where rownum<=1;
```

Table created.

```
SQL> select * from XML1;
```

XML_DESC

```
-----
<EMP><empno>1234</empno><ename></ename><job></job><mgr></mgr><mgr1></mgr1></EMP>
```

TOPIC 201

Backup & Recovery Strategies

Backup & Recovery Strategies

Backup & Recovery Strategies

Backup & Recovery Concepts

Physical & Logical Backup

Backup & Recovery Strategies

Back & Recovery Concepts

Backup and recovery is the set of concepts, procedures, and strategies involved in protecting the database against data loss caused by media failure or users errors.

In general, the purpose of a backup and recovery strategy is to protect the database against data loss and reconstruct lost data.

Backup & Recovery Strategies

Back & Recovery Concepts

A backup is a copy of data. A backup can include crucial parts of the database such as data files, the server parameter file, and control file. A sample backup and recovery scenario is a failed disk drive that causes the loss of a data file.

If a backup of the lost file exists, then you can restore and recover it. Media recovery refers to the operations involved in restoring data to its state before the loss occurred.

Backup & Recovery Strategies

Physical & Logical Backup

Backups can be divided into physical backups and logical backups.

Physical backups are backups of the physical files used in storing and recovering your database, such as datafiles, control files, and archived redo logs. Ultimately, every physical backup is a

copy of files storing database information to some other location, **whether on disk or some offline storage such as tape.**

Backup & Recovery Strategies

Physical & Logical Backup

Logical backups contain logical data (for example, tables or stored procedures) exported from a database with an Oracle export utility and stored in a binary file, for later re-importing into a database using the corresponding Oracle import utility.

Backup & Recovery Strategies

Physical & Logical Backup

Physical backups are the foundation of any sound backup and recovery strategy.

Logical backups are a useful supplement to physical backups in many circumstances but are not sufficient protection against data loss without physical backups.

Backup & Recovery Strategies

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Introduction to Database Administration

TOPIC 202

Understanding Physical & Logical Data Loss

Understanding Physical & Logical Data Loss

Understanding Physical & Logical Data Loss

Errors & Failures

Understanding User Error

Understanding Media Failure

Understanding Physical & Logical Data Loss

Errors & Failures

While there are several types of problem that can halt the normal operation of an Oracle database or affect database I/O operations, only two typically require DBA intervention and media recovery: media failure, and user errors.

Understanding Physical & Logical Data Loss

Errors & Failures

Other failures may require DBA intervention to restart the database (after an instance failure) or allocate more disk space (after statement failure due to, for instance, a full datafile) but these situations will not generally cause data loss or require recovery from backup.

Understanding Physical & Logical Data Loss

Understanding User Error

User errors occur when, either due to an error in application logic or a manual mis-step, data in your database is changed or deleted incorrectly.

Data loss due to user error includes such missteps as dropping important tables or deleting or changing the contents of a table.

Understanding Physical & Logical Data Loss

Understanding User Error

While user training and careful management of privileges can prevent most user errors, your backup strategy determines how gracefully you recover the lost data when user error does cause data loss.

Understanding Physical & Logical Data Loss

Understanding Media Failure

A media failure is the failure of a read or write of a disk file required to run the database, due to a physical problem with the disk such as a head crash. Any database file can be vulnerable to a media failure.

The appropriate recovery technique following a media failure depends on the files affected and the types of backup available.

Understanding Physical & Logical Data Loss

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Introduction to Database Administration

TOPIC 203

Full Logical Backup

Full Logical Backup

Full Logical Backup

Logical Backup

Logical Backup Entire Applications

Outcome of Logical Backup

Periodic Logical Backup

Full Logical Backup

Logical Backup

A logical backup copies data, but not physical files, from one location to another. A logical backup is used to move or archive a database, tables, or schemas and to verify database structures.

Full Logical Backup

Logical Backup Entire Applications

A full logical backup enables you to copy these items across environments that use different components, such as operating systems:

Entire applications

Data repositories such as the Oracle Hyperion Shared Services Registry and Oracle Essbase cubes

Individual artifacts such as scripts, data forms, and rule files

Full Logical Backup

Outcome of Logical Backup

A logical export backup generates necessary Structured Query Language (SQL) statements to obtain all table data that is written to a binary file.

A logical export backup does not contain database instance-related information, such as the physical disk location, so you can restore the same data on another database machine.

Full Logical Backup

Periodic Logical Backup

Periodic logical export backups (at least weekly) are recommended in case physical backups fail or the database machine becomes unavailable.

Full Logical Backup

Logical Backup using EXPORT

```
E:\app\Haider\product\11.2.0\dbhome_1\BIN>exp

Export: Release 11.2.0.1.0 - Production on Wed Nov 11 19:29:15 2020

Copyright (c) 1982, 2009, Oracle and/or its affiliates. All rights reserved.

Username: scott/tiger

Connected to: Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 - Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options
Enter array fetch buffer size: 4096 >

Export file: EXPDAT.DMP > c:\t1.dmp

(1)E(ntire database), (2)U(sers), or (3)T(ables): (2)U >
```

Full Logical Backup

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Introduction to Database Administration

TOPIC 204

Logical Backup of a Schema/ User

Logical Backup of a Schema/ User

Logical Backup of a Schema/ User

Logical Backup of Schema
Export utility for Logical Backup
Benefits of Export Utility for Logical Backup
Logical Backup of a Schema/ User

Logical Backup of Schema

A logical backup copies the data in the database and does not records the location of data.
It can copy the data of schema,
database and tables
Logical Backup of a Schema/ User

Export utility for Logical Backup

The export utility (export and export pump) offered by the Oracle can be used to take logical backup.
The export utility copies the data and database definitions, and saves in binary OS file in Oracle internal format
Logical Backup of a Schema/ User

Benefits of Export Utility for Logical Backup

Data block corruption can be detected while exporting data and export procedure will fail.
If use drops some table and it will recover from import command.
What data and definition/ structure can be exported?
Portable backup, can be imported in same or higher version of Oracle database.
Logical Backup of a Schema/ User

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Introduction to Database Administration

TOPIC 205

Logical Backup of Schema Contents Tables

Logical Backup of Schema Contents Tables

Logical Backup of Schema Contents Tables

Logical Backup of Schema Contents Tables

Logical Backup Full/ Tables

Export using Full Option

Export with Individual Table

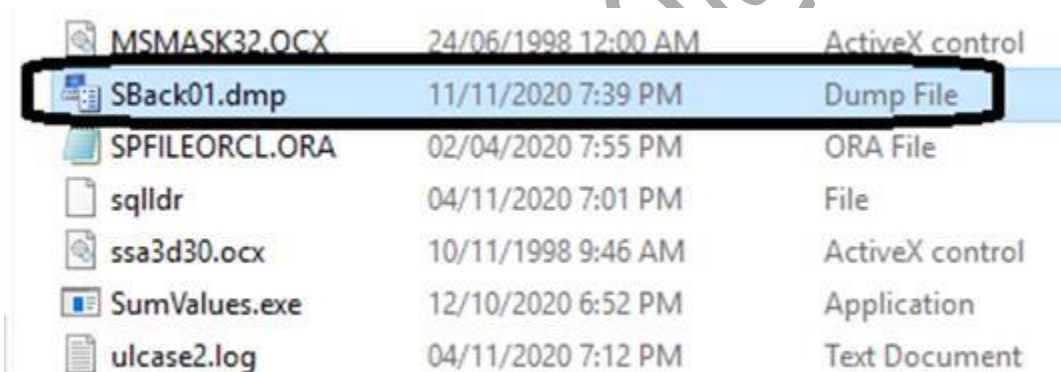
Logical Backup of Schema Contents Tables

Logical Backup Full/ Tables

Run export command with Full=y option.

User will be scott/tiger

Export data of some table



MSMASK32.OCX	24/06/1998 12:00 AM	ActiveX control
SBack01.dmp	11/11/2020 7:39 PM	Dump File
SPFILEORCL.ORA	02/04/2020 7:55 PM	ORA File
sqlldr	04/11/2020 7:01 PM	File
ssa3d30.ocx	10/11/1998 9:46 AM	ActiveX control
SumValues.exe	12/10/2020 6:52 PM	Application
ulcase2.log	04/11/2020 7:12 PM	Text Document

Logical Backup of Schema Contents Tables

```
E:\app\Haider\product\11.2.0\dbhome_1\BIN>exp scott/tiger full=y file=c:\test\FBack01.dmp constraints=Y

Export: Release 11.2.0.1.0 - Production on Wed Nov 11 19:49:30 2020

Copyright (c) 1982, 2009, Oracle and/or its affiliates. All rights reserved.

Connected to: Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 - Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options
Export done in WE8MSWIN1252 character set and AL16UTF16 NCHAR character set

About to export the entire database ...
. exporting tablespace definitions
. exporting profiles
. exporting user definitions
. exporting roles
. exporting resource costs
. exporting rollback segment definitions
. exporting database links
. exporting sequence numbers
. exporting directory aliases
. exporting context namespaces
. exporting foreign function library names
. exporting PUBLIC type synonyms
. exporting private type synonyms
. exporting object type definitions
. exporting system procedural objects and actions
```

Export using Full Option

Logical Backup of Schema Contents Tables

Export with Individual Table

```

Username: scott/tiger

Connected to: Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 - Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options
Enter array fetch buffer size: 4096 >

Export file: EXPDAT.DMP > c:\test\emp.dmp

(1)E(ntire database), (2)U(sers), or (3)T(ables): (2)U > t

Export table data (yes/no): yes >

Compress extents (yes/no): yes >

Export done in WE8MSWIN1252 character set and AL16UTF16 NCHAR character set

About to export specified tables via Conventional Path ...
Table(T) or Partition(T:P) to be exported: (RETURN to quit) > EMP

. . exporting table                                EMP                17 rows exported
Table(T) or Partition(T:P) to be exported: (RETURN to quit) > DEPT

. . exporting table                                DEPT                   4 rows exported
Table(T) or Partition(T:P) to be exported: (RETURN to quit) >

Export terminated successfully without warnings.

E:\app\Haider\product\11.2.0\ddhome_1\BIN>

```

Logical Backup of Schema Contents Tables

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Introduction to Database Administration

TOPIC 206

Cold Physical Backup

Cold Physical Backup

Cold Physical Backup

Cold Physical Backup

Cold Physical Backup Files
Performing Cold Backup
Cold Physical Backup

Cold Physical Backup

Offline or cold backups are performed when the database is completely shutdown. The disadvantage of an offline backup is that it cannot be done if the database needs to be run 24/7.

Additionally, you can only recover the database up to the point when the last backup was made **unless the database is running in ARCHIVELOG mode.**

Cold Physical Backup

Cold Physical Backup Files

An offline backup consists of physically copying the following files:

Data files

Control files

Init.ora and config.ora files Warning: If you make a cold backup in ARCHIVELOG mode do not backup redo log files.

Cold Physical Backup

Performing Cold Backup

Before performing a cold backup, you need to know the location of the files that need to be backed up.

Because the database structure changes day to day as more files get added or moved between directories, it is always better to query the database to get the physical structure of database before making a cold backup.

Cold Physical Backup

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Introduction to Database Administration

TOPIC 207

Cold Backup using RMAN

Cold Backup using RMAN

Cold Backup using RMAN

Cold Backup using RMAN

Start Backup using RMAN

Cold Backup using RMAN

Cold Backup using RMAN

Keep Database in Archive Mode

Go to location where RMAN can run E:\app\Haider\product\11.2.0\dbhome_1

\BIN>rman target / RMAN>show all;

Cold Backup using RMAN

Start Backup using RMAN

RMAN> Backup as Backupset database;

```
C:\>dir \rmanbackup\rman
Volume in drive C has no label.
Volume Serial Number is 4E83-C14F

Directory of C:\rmanbackup\rman

11/26/2014  10:16 PM    <DIR>          .
11/26/2014  10:16 PM    <DIR>          ..
11/26/2014  10:16 PM             650,985,472  FULL_0HP0K2RP_17_1
11/26/2014  10:16 PM             7,143,424  FULL_0IP0K2TH_18_1
                2 File(s)      658,128,896 bytes
                2 Dir(s)    447,372,935,168 bytes free
```

Cold Backup using RMAN

NOTE

[CHECK THE VIDEO OF THIS TOPIC BECAUSE IT CONSIST ON PROPER PRACTICAL WORK]

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TOPIC 208

Hot Backup Concepts

Hot Backup Concepts

Hot Backup Concepts

Hot Backup Concepts

Startup Archive Mode

Hot Backup Concepts

Hot Backup Concepts

A hot backup is taken when the database needs to run all the time.

It is an online backup.

All files of the database are copied and there may be changes to the database during the copy.

Hot Backup Concepts

Hot Backup Concepts

An online backup or hot backup is also referred to as ARCHIVE LOG backup. An online backup can only be done when the database is running in ARCHIVELOG mode and the database is open.

When the database is running in ARCHIVELOG mode, the archiver (**ARCH**) background process will make a copy of the online redo log file to archive backup location.

Hot Backup Concepts

Hot Backup Concepts

An online backup consists of backing up the following files. But, because the database is open while performing a backup, you have to follow the procedure to backup the following files:

Data files of each tablespace

Archived redo log files

Control file

Init.ora and config.ora files
Hot Backup Concepts

Startup Archive Mode

Shutdown database and startup
NoArchive to Archive database process

```
Database dismounted.  
ORACLE instance shut down.  
SQL> startup open;  
ORACLE instance started.  
  
Total System Global Area 3390558208 bytes  
Fixed Size                2180464 bytes  
Variable Size             1862273680 bytes  
Database Buffers          1509949440 bytes  
Redo Buffers              16154624 bytes  
Database mounted.  
Database opened.  
SQL> archive log list;  
Database log mode          Archive Mode  
Automatic archival         Enabled  
Archive destination        USE_DB_RECOVERY_FILE_DEST  
Oldest online log sequence 244  
Next log sequence to archive 246  
Current log sequence       246
```

Hot Backup Concepts

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Introduction to Database Administration

TOPIC 209

Hot Backup Demo
Hot Backup Demo

Hot Backup Demo

Hot Backup Demo
Advise for Hot Backup
Hot Backup Demo

Hot Backup Demo

Following steps are required for Hot Backup:

Put the tablespace in the Backup mode and copy the data files.

Back up the control and Init.ora files.

Stop archiving

Back up the archive files

Restart the archive process.

Hot Backup Demo

Advise for Hot Backup

An online backup of a database will keep the database open and functional for 24/7 operations. It is advised to schedule online backups when there is the least user activity on the database, because backing up the database is very I/O intensive and users can see slow response during the backup period. Additionally, if the user activity is very high, the archive destination might fill up very fast.

Hot Backup Demo

NOTE

[CHECK THE VIDEO OF THIS TOPIC BECAUSE IT CONSIST ON PROPER PRACTICAL WORK]

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Introduction to Database Administration

TOPIC 210

Restore from Backup using RMAN

Restore from Backup using RMAN

Restore from Backup using RMAN

Shutdown database

Remove files from E:\app\Haider\oradata\orcl

Startup nomount

Login with RMAN target /

Restore controlfile

Alter database mount;

Restore database

Recover database;

Resetlogs & Recovered Files

Restore from Backup using RMAN

Shutdown Database Now for recovery first off all shutdown your database using “shutdown abort”

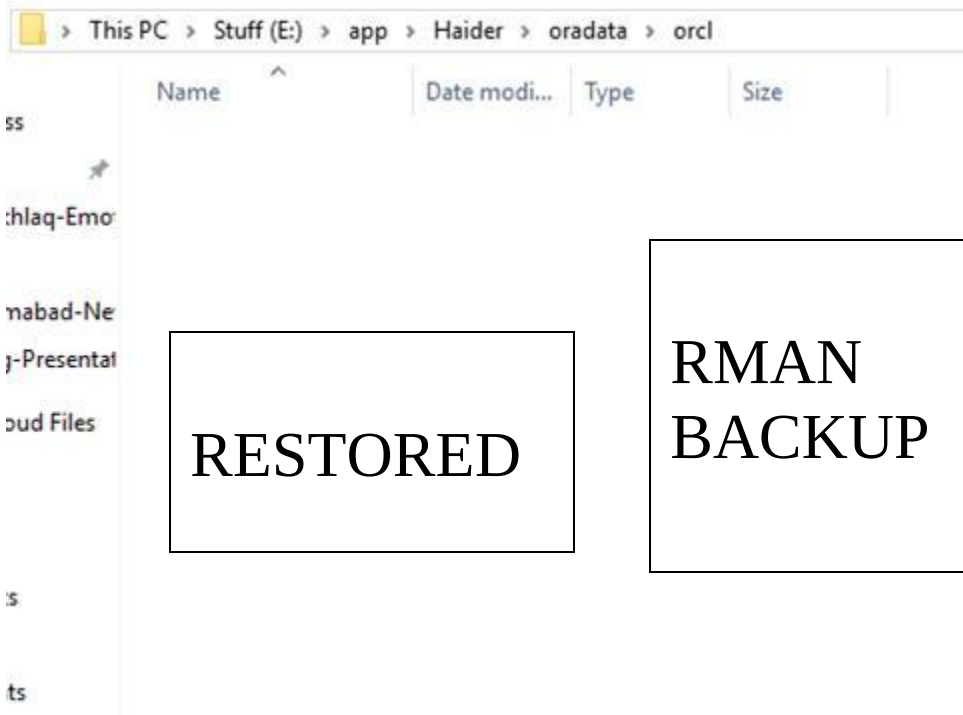
```
RMAN> shutdown abort
```

```
using target database control file instead of recovery catalog  
Oracle instance shut down
```

Restore from Backup using RMAN

Remove Files from E:\app\Haider\oradata\orcl

Now remove your database or do any change in database, here we physically removed all database files from database



Restore from Backup using RMAN

Startup nomount

```
RMAN> startup nomount;
Oracle instance started
Total System Global Area          293601280 bytes
Fixed Size                        1290208 bytes
Variable Size                     146800672 bytes
Database Buffers                   138412032 bytes
Redo Buffers                       7098368 bytes
RMAN>
```

Restore from Backup using RMAN

Login with RMAN target /

```
C:\oracle\product\10.2.0\db_1\bin>rman target /  
Recovery Manager: Release 10.2.0.3.0 - Production on Thu Nov 27 06:58:55 2014  
Copyright (c) 1982, 2005, Oracle. All rights reserved.  
connected to target database (not started)  
RMAN>
```

Restore from Backup using RMAN

Restore Control Files

```
RMAN> restore controlfile from 'C:\rmanbackup\rman\FULL_01POK2TH_18_1';  
Starting restore at 27-NOV-14  
using target database control file instead of recovery catalog  
allocated channel: ORA_DISK_1  
channel ORA_DISK_1: sid=156 devtype=DISK  
  
channel ORA_DISK_1: restoring control file  
channel ORA_DISK_1: restore complete, elapsed time: 00:00:10  
output filename=C:\ORACLE\PRODUCT\10.2.0\ORADATA\ORCL\CONTROL01.CTL  
output filename=C:\ORACLE\PRODUCT\10.2.0\ORADATA\ORCL\CONTROL02.CTL  
output filename=C:\ORACLE\PRODUCT\10.2.0\ORADATA\ORCL\CONTROL03.CTL  
Finished restore at 27-NOV-14
```

Restore from Backup using RMAN

Alter Database Mount

```

RMAN> alter database mount;

database mounted
released channel: ORA_DISK_1

```

Restore from Backup using RMAN

Restore Database

```

RMAN> restore database;

Starting restore at 27-NOV-14
Starting implicit crosscheck backup at 27-NOV-14
allocated channel: ORA_DISK_1
channel ORA_DISK_1: sid=156 devtype=DISK

```

Restore from Backup using RMAN

Recover Database

```

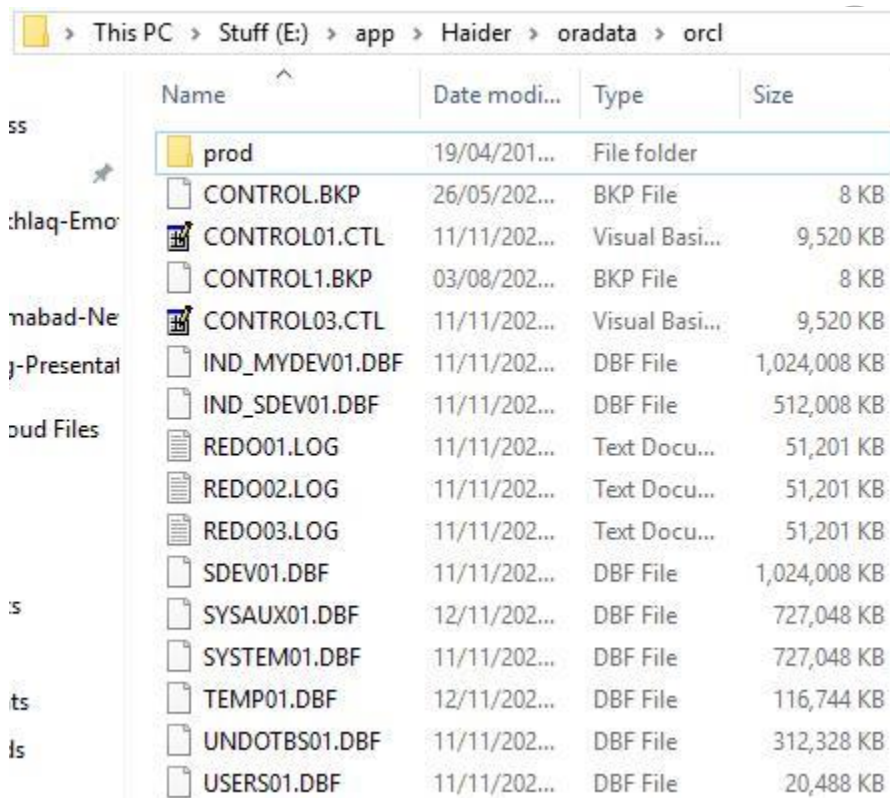
restoring datafile 00009 to C:\ORACLE\PRODUCT\10.2.0\ORADATA\MEDLAB01.DBF
restoring datafile 00010 to C:\ORACLE\PRODUCT\10.2.0\ORADATA\TESTING01.DBF
restoring datafile 00011 to C:\ORACLE\PRODUCT\10.2.0\ORADATA\MED_PHARMA01.DBF
restoring datafile 00012 to C:\ORACLE\PRODUCT\10.2.0\ORADATA\MED_INDX01.DBF
restoring datafile 00013 to C:\ORACLE\PRODUCT\10.2.0\ORADATA\MED_INDX01.DBF
channel ORA_DISK_1: reading from backup piece C:\RMANBACKUP\RMAN\FULL_0HP0K2RP_1
7_1
channel ORA_DISK_1: restored backup piece 1
piece handle=C:\RMANBACKUP\RMAN\FULL_0HP0K2RP_17_1 tag=TAG20141126T221521
channel ORA_DISK_1: restore complete, elapsed time: 00:04:25
Finished restore at 27-NOV-14
RMAN>

```

Restore from Backup using RMAN

Resetlogs & Recovered Files

```
RMAN> alter database open resetlogs;  
  
database opened  
  
RMAN> _
```



Name	Date modi...	Type	Size
prod	19/04/201...	File folder	
CONTROL.BKP	26/05/202...	BKP File	8 KB
CONTROL01.CTL	11/11/202...	Visual Basi...	9,520 KB
CONTROL1.BKP	03/08/202...	BKP File	8 KB
CONTROL03.CTL	11/11/202...	Visual Basi...	9,520 KB
IND_MYDEV01.DBF	11/11/202...	DBF File	1,024,008 KB
IND_SDEV01.DBF	11/11/202...	DBF File	512,008 KB
REDO01.LOG	11/11/202...	Text Docu...	51,201 KB
REDO02.LOG	11/11/202...	Text Docu...	51,201 KB
REDO03.LOG	11/11/202...	Text Docu...	51,201 KB
SDEV01.DBF	11/11/202...	DBF File	1,024,008 KB
SYSAUX01.DBF	12/11/202...	DBF File	727,048 KB
SYSTEM01.DBF	11/11/202...	DBF File	727,048 KB
TEMP01.DBF	12/11/202...	DBF File	116,744 KB
UNDOTBS01.DBF	11/11/202...	DBF File	312,328 KB
USERS01.DBF	11/11/202...	DBF File	20,488 KB

Restore from Backup using RMAN

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Introduction to Database Administration

TOPIC 211

Partial Restore Logical Backup

Partial Restore Logical Backup

Partial Restore Logical Backup

Partial Restore Logical Backup

Steps Partial Restore Logical Backup

Partial Restore Tablespace

Restore Archive Logs

Partial Restore Logical Backup

Partial Restore Logical Backup

A partial database backup includes a subset of the database: individual tablespaces or data files. A tablespace backup is a backup of all the data files in a tablespace or in multiple tablespaces. Partial Restore Logical Backup

Partial Restore Logical Backup

Tablespace backups, whether consistent or inconsistent, are valid only if the database is operating in ARCHIVELOG mode because redo is required to make the restored tablespace consistent with the rest of the database.

Partial Restore Logical Backup

Steps of Partial Restore Logical Backup

Before beginning a backup of a tablespace, identify all of the datafiles in the tablespace with the DBA_DATA_FILES data dictionary view:

```
SELECT TABLESPACE_NAME, FILE_NAME FROM SYS.DBA_DATA_FILES  
WHERE TABLESPACE_NAME = 'USERS';
```

Partial Restore Logical Backup

Steps Partial Restore Logical Backup

Mark the beginning of the online tablespace backup:

Back up the online datafiles of the online tablespace with operating system commands

After backing up the datafiles of the online tablespace, run the SQL statement ALTER TABLESPACE with the END BACKUP option

Partial Restore Logical Backup

Steps Partial Restore Logical Backup

Archive the unarchived redo logs so that the redo required to recover the tablespace backup is archived

Partial Restore Logical Backup

Partial Restore Tablespace

RMAN> restore tablespace users; RMAN> recover tablespace users;

Partial Restore Logical Backup

Restore Archive Logs

mkdir d:\archive rman target / RMAN> run {

2> set archivelog destination to 'd:\archive';

3> restore archivelog all; 4> }

Partial Restore Logical Backup

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Introduction to Database Administration

TOPIC 212

Complete & Incomplete Recovery

Complete & Incomplete Recovery

Complete & Incomplete Recovery

Complete Recovery
Incomplete Recovery
Database point-in-time Recovery
Requirements for DPITR
Parents, Ancestor & Sibling Incarnations
Database Incarnation History with Multiple Resetlogs
DPITR Incarnations
DPITR Commands
Complete & Incomplete Recovery

Complete Recovery

Complete recovery applies all redo changes contained in the archived and online logs to a backup. Typically, you perform complete media recovery after a media failure damages data files or the control file. You can perform complete recovery on a database, tablespace, or data file.

Complete & Incomplete Recovery

Incomplete Recovery

Incomplete recovery, also called database point-in-time recovery, results in a noncurrent version of the database. In this case, you do not apply all of the redo generated after the restored backup. Typically, you perform point-in-time database recovery to undo a user error when Flashback Database is not possible.

Complete & Incomplete Recovery

Incomplete Recovery

To perform incomplete recovery, you must restore all data files from backups created before the time to which you want to recover and then open the database with the RESETLOGS option when recovery completes. Resetting the logs creates a new stream of log sequence numbers starting with log sequence 1.

Complete & Incomplete Recovery

Database point-in-time Recovery

Database point-in-time recovery (DBPITR)

restores the database from backups prior to the target time for recovery, then uses incremental backups and redo to roll the database forward to the target time.

DBPITR is sometimes called **incomplete recovery** because it does not use all of the available redo or completely recover all changes to your database.

Complete & Incomplete Recovery

Database point-in-time Recovery

The target SCN can be specified using a date and time, in which case the operation is sometimes called **time-based recovery**.

Complete & Incomplete Recovery

Requirements for DPITR

The requirements for database point-in-time recovery are as follows:

Your database must be running in ARCHIVELOG mode.

You must have backups of all data files from before the target SCN for **DBPITR** and archived redo logs for the period between the SCN of the backups and the target SCN.

Complete & Incomplete Recovery

Parents, Ancestor & Sibling Incarnations

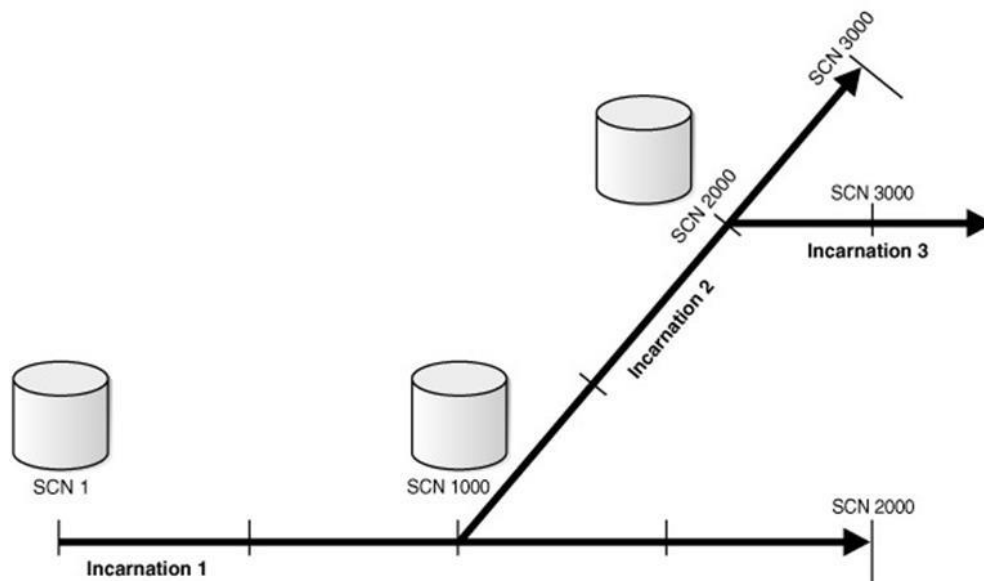
The incarnation from which the current incarnation branched following an OPEN RESETLOGS operation is called the parent incarnation of the current incarnation.

The parent incarnation and all of its parent incarnations are the ancestor incarnations of the current incarnation.

Two incarnations that share a common ancestor are sibling incarnations if neither one is an ancestor of the other.

Complete & Incomplete Recovery

Database Incarnation History with Multiple Resetlogs



Complete & Incomplete Recovery

DPITR Incarnations

The requirements for database point-in-time recovery are as follows:

Your database must be running in ARCHIVELOG mode.

You must have backups of all data files from before the target SCN for **DBPITR** and archived redo logs for the period between the SCN of the backups and the target SCN.

Complete & Incomplete Recovery

DPITR Commands

```
RMAN> RECOVER DATABASE TO SCN 1500;
```

```
RMAN> RESET DATABASE INCARNATION  
TO 1;
```

```
RMAN> RECOVER DATABASE TO SCN  
1500;
```

Complete & Incomplete Recovery

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Introduction to Database Administration

TOPIC 213

Understanding of Import/ Export

Understanding of Import/ Export

Understanding of Import/ Export

Export Utility

Export Dump File

Export Commands

Import Utility

Import Ordering

Export Commands

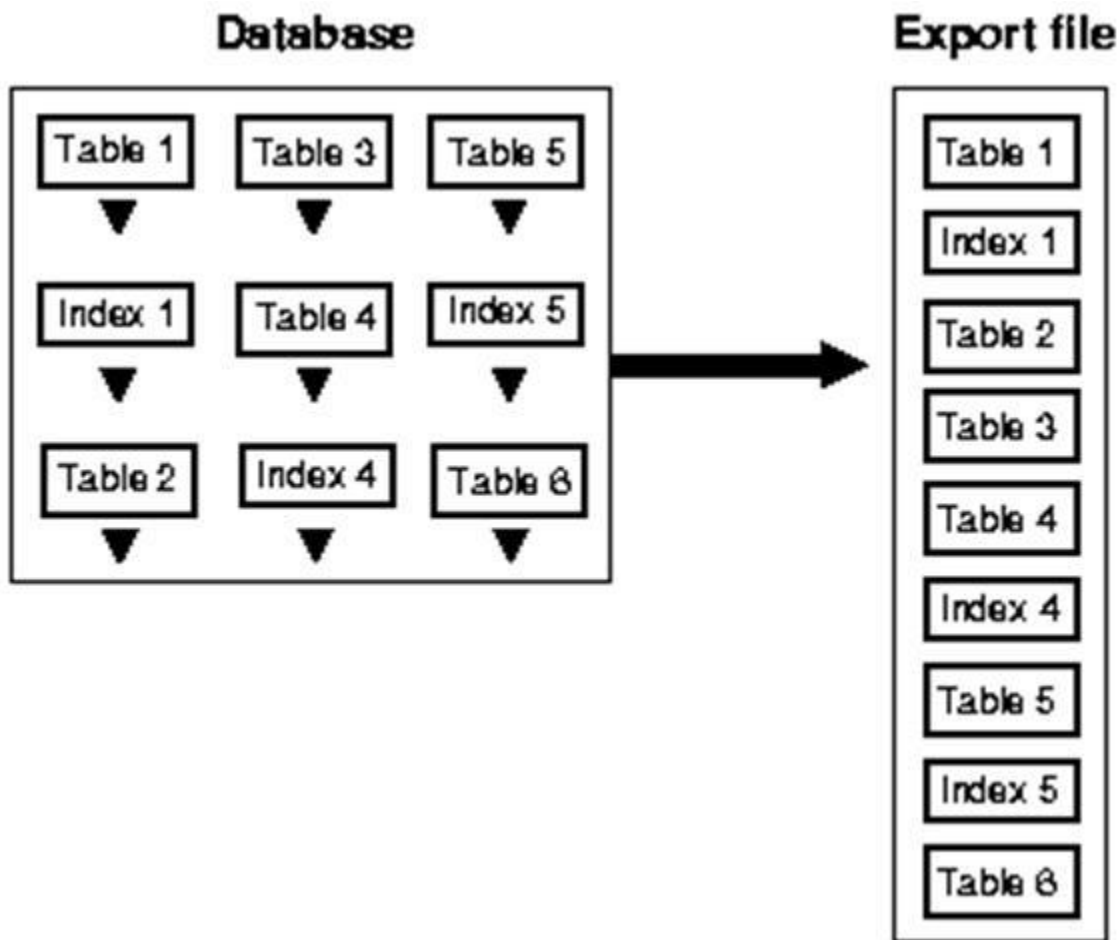
Understanding of Import/ Export

Export Utility

The Export utility provides a simple way for you to transfer data objects between Oracle databases, even if they reside on platforms with different hardware and software configurations. When you run Export against an Oracle database, objects (such as tables) are extracted, followed by their related objects (such as indexes, comments, and grants), if any. The extracted data is written to an Export file.

Understanding of Import/ Export

Export Utility



Understanding of Import/ Export

Export Dump File

An Export file is an Oracle binary- format dump file that is typically located on disk or tape. The dump files can be transferred using FTP or physically transported (in the case of tape) to a different site. The files can then be used with the Import utility to transfer data between databases that are on systems not connected through a network. The files can also be used as backups in addition to normal backup procedures.

Understanding of Import/ Export

Export Dump File

Export dump files can only be read by the Oracle Import utility. The version of the Import utility cannot be earlier than the version of the Export utility used to create the dump file. You can also display the contents of an export file without actually performing an import. To do this, use the Import SHOW parameter.

Understanding of Import/ Export

Export Commands

exp PARFILE=filename

exp username/password PARFILE=filename

FULL=y FILE=dba.imp GRANTS=y INDEXES=y CONSISTENT=y

exp username/password PARFILE=params.dat INDEXES=n exp \username/password AS SYSDBA\

Understanding of Import/ Export

Import Utility

The Import utility reads the object definitions and table data from an Export dump file. It inserts the data objects into an Oracle database.

Understanding of Import/ Export

Import Ordering

The export file contains objects in the following order

Type definitions

Table definitions

Table data

Table indexes

Integrity constraints, views,

procedures, and triggers

Bitmap, functional, and domain indexes

Understanding of Import/ Export

Export Commands

imp username/password PARAMETER=value or

imp username/password PARAMETER=(value1,value2,...,valuen)

imp PARFILE=filename

imp username/password PARFILE=filename FULL=y FILE=dbay INDEXES=y
CONSISTENT=y

Introduction to Database Administration

TOPIC 214

Controlling & Configuring Import/ Export

Controlling & Configuring Import/ Export

Controlling & Configuring Import/ Export

Error Handling

Failed Integrity Constraints

Invalid Data

Errors Importing Objects

Object Already Exists

Sequence

Partition Level Import

Controlling & Configuring Import/ Export

Error Handling

If a row is rejected due to an integrity constraint violation or invalid data, Import displays a warning message but continues processing the rest of the table. Some errors, such as "tablespace full," apply to all subsequent rows in the table. These errors cause Import to stop processing the current table and skip to the next table.

A "tablespace full" error can suspend the import if the RESUMABLE=y parameter is specified.

Controlling & Configuring Import/ Export

Failed Integrity Constraints

A row error is generated if a row violates one of the integrity constraints in force on your system, including:

NOT NULL constraints

Uniqueness constraints

Primary key (not null and unique)
constraints

Referential integrity constraints

Check constraints
Controlling & Configuring Import/ Export

Invalid Data

Row errors can also occur when the column definition for a table in a database is different from the column definition in the export file.

The error is caused by data that is too long to fit into a new table's columns, by invalid datatypes, or by any other INSERT error.

Controlling & Configuring Import/ Export

Errors Importing Objects

Errors can occur for many reasons when you import database objects.

When these errors occur, import of the current database object is discontinued. Import then attempts to continue with the next database object in the export file.

Controlling & Configuring Import/ Export

Object Already Exists

If a database object to be imported already exists in the database, an object creation error occurs. What happens next depends on the setting of the IGNORE parameter.

If IGNORE=n (the default), the error is reported, and Import continues with the next database object. The current database object is not replaced.

Controlling & Configuring Import/ Export

Object Already Exists

If IGNORE=y, object creation errors are not reported. The database object is not replaced. If the object is a table, rows are imported into it. Note that only object creation errors are ignored; all other errors (such as operating system, database, and SQL errors) are reported and processing may stop.

Controlling & Configuring Import/ Export

Sequence

If sequence numbers need to be reset to the value in an export file as part of an import, you should drop sequences.

If a sequence is not dropped before the import, it is not set to the value captured in the export file, because Import does not drop and re-create a sequence that already exists. If the sequence already exists, the export file's CREATE SEQUENCE statement fails and the sequence is not imported.

Controlling & Configuring Import/ Export

Partition Level Import

You can import tables, partitions, and sub-partitions in the following ways:

Table-level Import: imports all data from the specified tables in an Export file.

Partition-level Import: imports only data from the specified source partitions or sub-partitions.

You must set the parameter IGNORE=y when loading data into an existing table.

Introduction to Database Administration

TOPIC 215

Walkthrough Import when Table Data Exist

Walkthrough Import when Table Data Exist

Walkthrough Import when Table Data Exist

Import When Table Already Exists

Walkthrough Import when Table Data Exist

Import when Table Already Exist

When tables are manually created before data is imported, the CREATE TABLE statement in the export dump file will fail because the table already exists. To avoid this failure and continue loading data into the table, set the import parameter IGNORE=y. Otherwise, no data will be loaded into the table because of the table creation error or use **table_exists_action=append** using expdp and impdp

Walkthrough Import when Table Data Exist

NOTE

[CHECK THE VIDEO OF THIS TOPIC BECAUSE IT CONSIST ON PROPER PRACTICAL WORK]

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Introduction to Database Administration

TOPIC 216

Walkthrough Import with Moving Objects

Walkthrough Import with Moving Objects

Walkthrough Import with Moving Objects

Portal Import

Moving Data to the Target System

Walkthrough Import with Moving Objects

Portal Import

Create transport sets and extract the content of the transport sets to transport tables. Transport sets contain the portal objects that you want to export to your target portal environment. This information is displayed in a manifest. The manifest is a list of objects in a transport set, used to provide a granular level of control over the export. For more information on the export process and using the Transport Sets

Walkthrough Import with Moving Objects

Portal Import

Move the transport sets from one system (source) to another (target) using the Transport Sets - Acquire Service portlet, or using the Oracle Portal Export and Import command- line scripts if there is an intervening firewall. Moving the transport set from the source to the target system using the Transport Sets

Walkthrough Import with Moving Objects

Portal Import

Import the objects from the transport tables to the target portal repository using the Import Transport Set portlet.

Walkthrough Import with Moving Objects

Moving Data to the Target System

To move your content using the Acquire Transport Sets portlet:

In the Transport Set - Acquire Services portlet, click the Browse Source Portals on the Administer page and check that the source portal you're moving data from is registered on the target instance.

If the source portal has not previously been registered, from the Acquire Transport Sets portlet, click Register A Source Portal and register. From the Transport Set - Acquire Services portlet, click Acquire Transport Sets to display the Acquire a Transport Set page.

Walkthrough Import with Moving Objects

Moving Data to the Target System

Specify the source portal and the transport set and click Acquire to start transferring the data. When the transfer is complete, click Display Manifest to display the transport set manifest. Click on the explicitly selected object to display the detailed manifest. Click Tree View to see the nested dependencies.

Click Close to return to the manifest, and then click Pre-check Now to perform a pre-check of the transferred data. The system checks that all object dependencies have been resolved. Click Display Manifest when the pre-check is complete and check the status column for errors. Resolve any errors before continuing with importing the transport set.

Moving Data to the Target System

Acquire a Transport Set



AcquireCancel

Acquire a Transport Set

Select a registered source portal containing transport sets. Then, select the transport set that you want to acquire for this portal.

* Registered Source Portal

* Acquire Transport Set

TIP The transport set you select will be acquired from the source portal to this portal.

AcquireCancel

Introduction to Database Administration

TOPIC 217

Logical Backup with Oracle Utilities

Logical Backup with Oracle Utilities

Logical Backup with Oracle Utilities

Logical Backup

Oracle Data Pump Architecture

Modes of Data Pump

Examples of Data Pump

Logical Backup with Oracle Utilities

Logical Backup

Logical backups are backups in which the export utility (for example Exp) uses SQL to read database data and then export it into a binary file at the operating system level. You can then import the data back into a database using the import utility (Imp).

Logical Backup with Oracle Utilities

Logical Backup

The Oracle Export Utility can create a file that contains all the objects in a particular schema. The file that is created can then be imported to the same schema to recover from a failure or to a different instance or schema for archiving purposes.

Logical Backup with Oracle Utilities

Oracle Data Pump Architecture

Data Pump consists of the following components:

expdp (Data Pump export utility) impdp(Data Pump import utility)
DBMS_DATAPUMP PL/SQL package(Data Pump application interface [API])
DBMS_METADATA PL/SQL package (Data Pump Metadata API)
Logical Backup with Oracle Utilities

Modes of Data Pump

Entire database
Schema level
Table level
Tablespace level
Transportable tablespace level
Logical Backup with Oracle Utilities

Examples of Data Pump

An example of Export:-

```
$ expdp mv_maint/foo directory=dp_dir dumpfile=full.dmp logfile=full.log full=y
```

An example of Import:-

```
$ impdp mv_maint/foo directory=dp_dir dumpfile=full.dmp logfile=fullimp.log full=y
```

Introduction to Database Administration

TOPIC 218

Walkthrough Export with Moving Objects

Walkthrough Export with Moving Objects

Walkthrough Export with Moving Objects

Pre-requisite Portal Export & Import
Command-line Access
Oracle Export & Import with Character Sets
Role of Character Sets in Export & Import
Walkthrough Export with Moving Objects

Pre-requisite Portal Export & Import

Oracle Portal instance information: Before beginning the export and import process, ensure you have the following information:

System Requirements
Additional Considerations
Walkthrough Export with Moving Objects

Pre-requisite Portal Export & Import

Privileges for Exporting and Importing
Content
Portal schema name.
Portal schema password.
Portal connect string information.
Portal user name.
Portal user password.
Company name (used only for hosted portal installations). In most cases, this should be left blank.
Walkthrough Export with Moving Objects

Oracle Export & Import with Character Sets

The Oracle Database exp utility always exports user data, including **Unicode data**, in the character sets of the export server. The character sets are specified when the database is created.

The Oracle Database imp utility automatically converts the data to the character sets of the import server.

Walkthrough Export with Moving Objects

Command-line Access

If you are using the Oracle Portal Export and Import command-line scripts to move the transport sets from one system to another, you must have command-line access to run the shell or command utilities generated by the export import process. The command-line utilities, in turn, access the Oracle Database exp and imp utilities, and the Oracle Portal instance.

Walkthrough Export with Moving Objects

Oracle Export & Import with Character Sets

Some 8-bit characters can be lost (that is, converted to 7-bit equivalents) when you import an 8-bit character set export file. This occurs if the client system has a native 7-bit character set or if the NLS_LANG operating system environment variable is set to a 7-bit character set. Most often, you notice that accented characters lose their accent marks.

Walkthrough Export with Moving Objects

Oracle Export & Import with Character Sets

Both the Oracle Database exp and imp utilities alert you of any required character set conversion before exporting or importing the data.

Walkthrough Export with Moving Objects

Role of Character Sets in Export & Import

```
E:\app\Haider\product\11.2.0\dbhome_1\BIN>imp scott/tiger IGNORE=y FILE = c:\test\Scott.d
Import: Release 11.2.0.1.0 - Production on Fri Nov 13 18:54:32 2020

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Connected to: Oracle Database 11g Enterprise Edition Release 11.2.0.1.0 - Production
With the Partitioning, OLAP, Data Mining and Real Application Testing options

Export file created by EXPORT:V11.02.00 via conventional path
import done in WE8MSWIN1252 character set and AL16UTF16 NCHAR character set
Import terminated successfully without warnings.
```

Introduction to Database Administration

TOPIC 219

General Overview of Database Manager

General Overview of Database Manager

General Overview of Oracle Enterprise Manager (OEM)

Starting OEM

Oracle Database Control Login

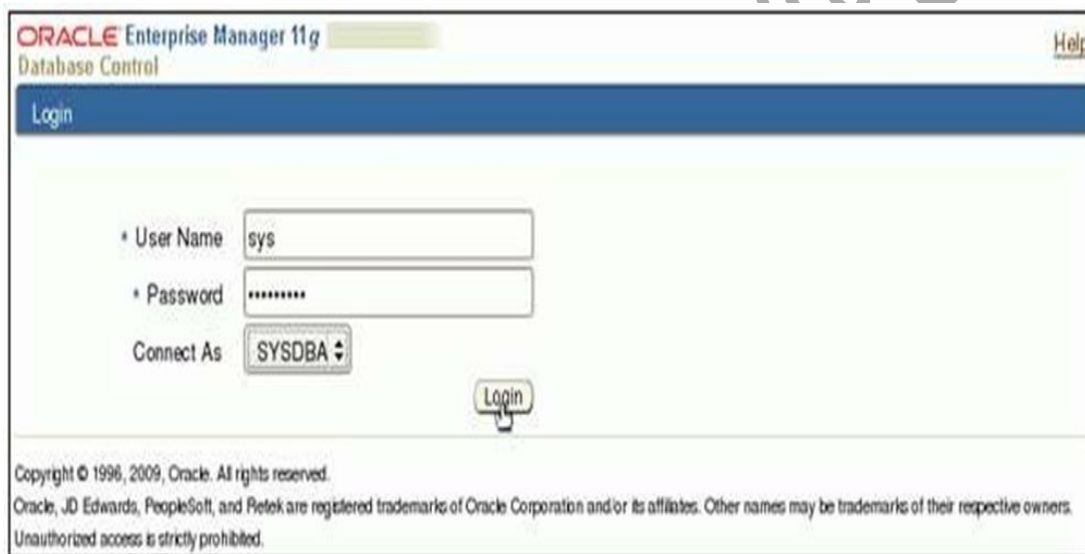
OEM Home Page
OEM - Grant Management Privileges
OEM - Users Credentials
General Overview of Database Manager

Starting OEM

On cmd (DOS prompt), you may run
set oracle_sid=orcl emctl stop dbconsole emctl start dbconsole

In the browser, you can run URL
<https://localhost:1158/em>
General Overview of Database Manager

Oracle Database Control Login



ORACLE Enterprise Manager 11g Database Control

Login

* User Name

* Password

Connect As

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Unauthorized access is strictly prohibited.

General Overview of Database Manager
OEM Home Page



General Overview of Database Manager

OEM – Grant Management Privileges

Oracle Enterprise Manager 11g Database Control. Logged in As SYS.

Enterprise Manager Configuration | Management Services and Repository | Agents

Administrators

Administrators are database users who can login to Enterprise Manager to perform management tasks like set Blackouts, email notification schedules.

Page Refreshed: Aug 20, 2009 12:19:56 PM EDT

Search: [] Go

View Edit Subscribe to Rules Delete Create

Select Name	Access
☒ SYS	Super Administrator
☐ SYSMAN	Repository Owner
☐ SYSTEM	Super Administrator

General Overview of Database Manager

OEM – Users Credentials

Setup **Preferences** Help Logout

Database

ORACLE Enterprise Manager 11g Database Control

Setup Preferences Help Logout Database

Preferences

General Preferred Credentials Notification Rules Schedule

General

Revert Apply

Password

To change your password, specify and confirm a new password.

Administrator: **SYS**

Current Password:

New Password:

Confirm New Password:

E-mail Addresses

These addresses are used to send notifications to you. You can specify multiple addresses if you want to be notified in different ways, and the format to use for each address. Later on, you will need to define a Notification Schedule before any e-mail notifications can be sent to you.

Select E-mail Address	Message Format
No e-mail addresses specified	

Add Another Row

General Overview of Database Manager

OEM – Users Credentials

ORACLE Enterprise Manager 11g Database Control

Setup Preferences Help Logout Database

Preferences

Preferred Credentials >

Database Preferred Credentials

Revert Apply

To set preferred credentials for Database targets, update the appropriate fields in one of the tables below. To delete credentials, clear the appropriate fields. The privilege settings must be already set on the host targets to set Run privileges. Press Apply after making any changes.

TIP Normal database credentials are used by Enterprise Manager functions that do not require database administrator privileges. SYSDBA database credentials are used by privileged functions that access non-open databases or perform database startup/shutdown operations. Host credentials are used by remote operations and jobs to run applications that access a database (e.g., SQLPLUS).

Target Credentials

Target credentials can be specified for each Database target.

Name	Host	UserName	Password	SYSDBA UserName	SYSDBA Password	Host Username	Host Password	Test
orcl.oracle.com	host01.example.com	system	*****	sys	*****	oracle	*****	Test

Revert Apply

Introduction to Database Administration

TOPIC 220

Transaction Processing

Transaction Processing

Transaction Processing

What is a Transaction?

Processing of Transactions

Processing of Transactions in Oracle

Transaction Processing

What is a Transaction?

SQL is initiated at user level (client) with Start-End and it executes on Server (central Database) at a certain distance.

A transaction is a logical, atomic unit of work (block) that contains one or more SQL statements.

Either transaction is done (**committed**) or not done (**rolled back**). No partial execution of transaction is allowed.

Transaction Processing

Processing of Transactions

Generally reflects the activities in the real world system

Depositing some amount in an account, will be a transaction

Transferring amount from one account to another; if ok then DB is in **consistent** state otherwise **inconsistent**.

One transaction can be calculating GPA in our exam system

Transaction Processing

Processing of Transactions in Oracle

In Oracle Database, each user must see a consistent view of the data, including visible changes made by a user's own transactions and committed transactions of other users.

Transaction Processing

Processing of Transactions in Oracle

Single-user VS multi-user systems

A DBMS is single-user if at most one user can use the system at a time

A DBMS is multi-user if many users can use the system concurrently

Problem

How to make the simultaneous interactions of multiple users with the database safe, consistent, correct, and efficient?

Introduction to Database Administration

TOPIC 221

Defining Transaction

Defining Transaction

Defining Transaction

What is a Transaction?

Transaction with SQL

Converting SQL into Transaction

Defining Transaction

What is a Transaction?

SQL is initiated at user level (client) with Start-End and it executes on Server (central Database) at a certain distance.

A transaction is a logical, atomic unit of work (block) that contains one or more SQL statements.

Either transaction is done (**committed**) or not done (**rolled back**). No partial execution of transaction is allowed.

Defining Transaction

What is a Transaction?

A transaction T is a logical unit of database processing that includes one or more database access operations

Embedded within an application program

Specified interactively (e.g., via SQL)

Transaction boundaries: Begin/end transaction

Types of transactions Read transaction write transaction

Defining Transaction

Transaction with SQL

For example, following SQL update will change the salary of some Employee

Update EMP Set sal = 850

Where empno = 7369;

Is it statement or a transaction?

Defining Transaction

Converting SQL into Transaction

```
begin
```

```
    Update EMP
```

```
    Set sal = 850
```

```
    Where empno = 7369;
```

```
end;
```

Defining Transaction

TOPIC 222

Role of Transaction

Role of Transaction

Role or Importance of Transactions

Transaction & SQL

Importance of Transaction Processing System

Transaction with Client-Server Environment

Role of Transaction

Transaction & SQL

Transaction is travelled on network, it may have chances of lost and it requires transaction logs for tracing

Can a simple SQL manages logs?

Can transaction in block manageable?

Issues of Multi-user environment.

Issues of Consistent, Correct and Efficiency are important.

Role of Transaction

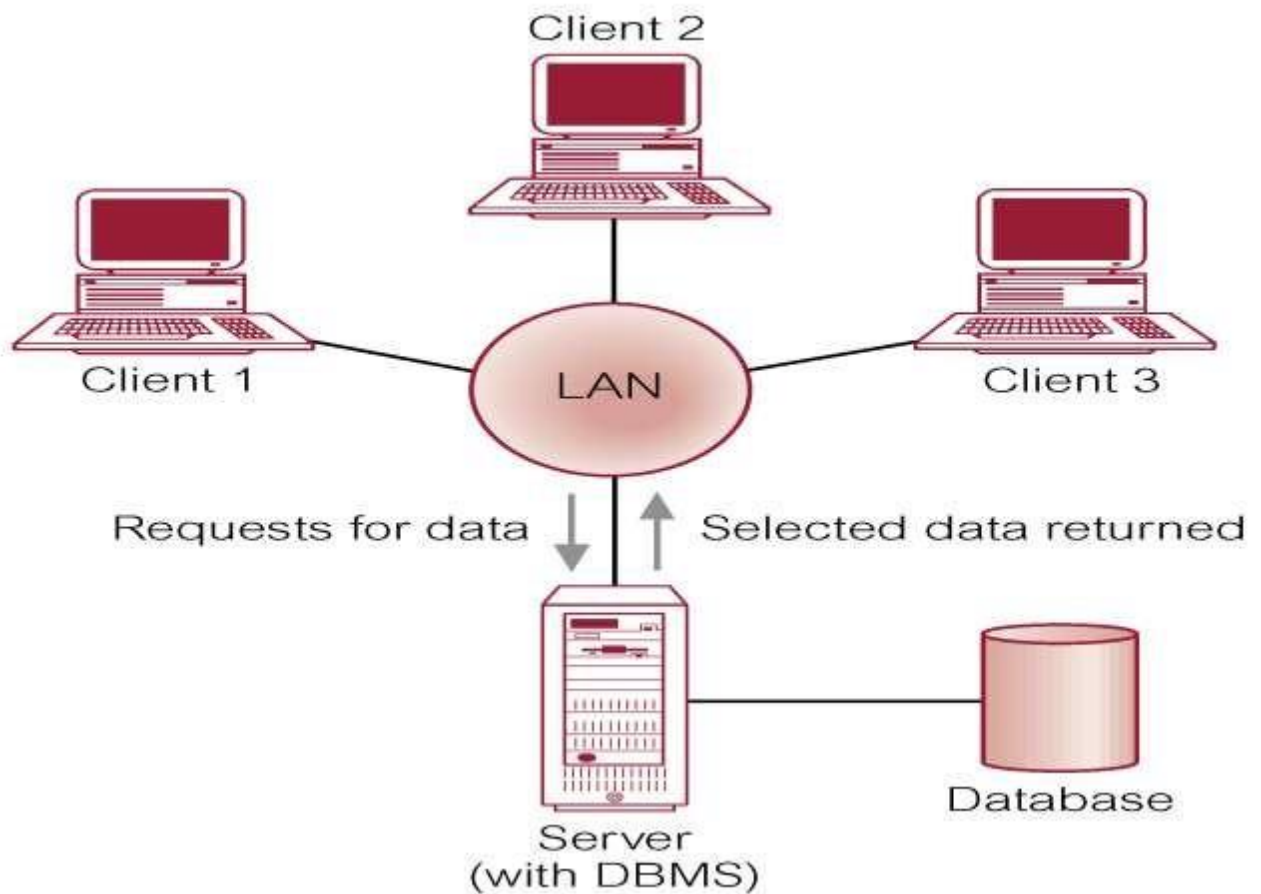
Importance of Transaction Processing System

Transaction processing (TP) systems underlie the online applications. a transaction rate of 15 simple Debit Credit transactions per second was “common”, 50 TPS was a “good” system, 100 TPS was “fast”, and a 400 TPS system was characterized as being a very “lean and mean” system.

Teradata capabilities, usage of parallel databases, configuration and tuning etc.

Role of Transaction

Transaction with Client-Server Environment



Introduction to Database Administration

TOPIC 223

Examples of Transactions

Examples of Transactions

Example of Transactions

Usage of ATM - An Example

Funds Transfer Concept

Writing a Transaction

Examples of Transactions

Usage of ATM – An Example

Usage of ATM to draw/ transfer money, to collect currency with dispenser



Examples of Transactions

Funds Transfer Concept

Transfer 400,000 from checking account to savings account For a user it is one activity

To database:

Read balance of checking account: read(X) Read balance of savings account: read (Y) Subtract 400,000 from X

Add 400,000 to Y

Write new value of X back to disk Write new value of Y back to disk

Examples of Transactions

Writing a Transaction

T1

t_0

```
read_item(X);
read_item(Y);
X:=X - 400000;
Y:=Y + 400000;
write_item(X);
write_item(Y);
```

t_k

Introduction to Database Administration

TOPIC 224

Examples of Transactions

Examples of Transactions

Example of Transactions

Retail System - An Example

Transactions & Their Issues

Examples of Transactions

Retail Store – An Example

Invoice is issued a transaction when
buying items

What happened multiple invoices are issued in Multi-user environment
Examples of Transactions

Transactions and their Issues

Client-I

PHARMACY

Street # 87 , Islamabad Tel. (051) 37

DSL# 9671

Bill# 11799

10-Apr-2019 03:31:43

Name:

Med Description	Qty	Price	Amount
PANADOL TAB 200S	10	1.32	13.20
DISPRIN TAB 600S	5	1.60	8.00
Total Qty: 2		Total:	21.2
Salesman: hafiz		Disc:	0
Paid: 30		Net Total:	21.2
		Balance:	8.8

Refrigerator items & cutting strips are not refundable or exchangable. Disc not applied on non-medicine
Please check all items as prescription, Thank You

Client-II

PHARMACY

Street # 87 , Islamabad Tel. (051) 37

DSL# 9671

Bill# 11799

10-Apr-2019 03:31:53

Name:

Med Description	Qty	Price	Amount
PANADOL SYP NEW	1	78.10	78.10
PANADOL TAB 200S	10	1.32	13.20
DISPRIN TAB 600S	5	1.60	8.00
Total Qty: 3		Total:	99.3
Salesman: hafiz		Disc:	0
Paid: 100		Net Total:	99.3
		Balance:	0.7

Refrigerator items & cutting strips are not refundable or exchangable. Disc not applied on non-medicine
Please check all items as prescription, Thank You

TOPIC 225

Transactions Read & Write

Transactions Read & Write

Example of Transactions

Transaction Read Item

Transaction Write Item

Two Transactions

Transactions Read & Write

Transaction Read Item

A database is represented as a collection of named data items

Read-item (X)

Find the address of the disk block that contains item X

Copy the disk block into a buffer in main memory

Copy the item X from the buffer to the program variable named X

Transactions Read & Write

Transactions Write Item

Write-item (X)

Find the address of the disk block that contains item X.

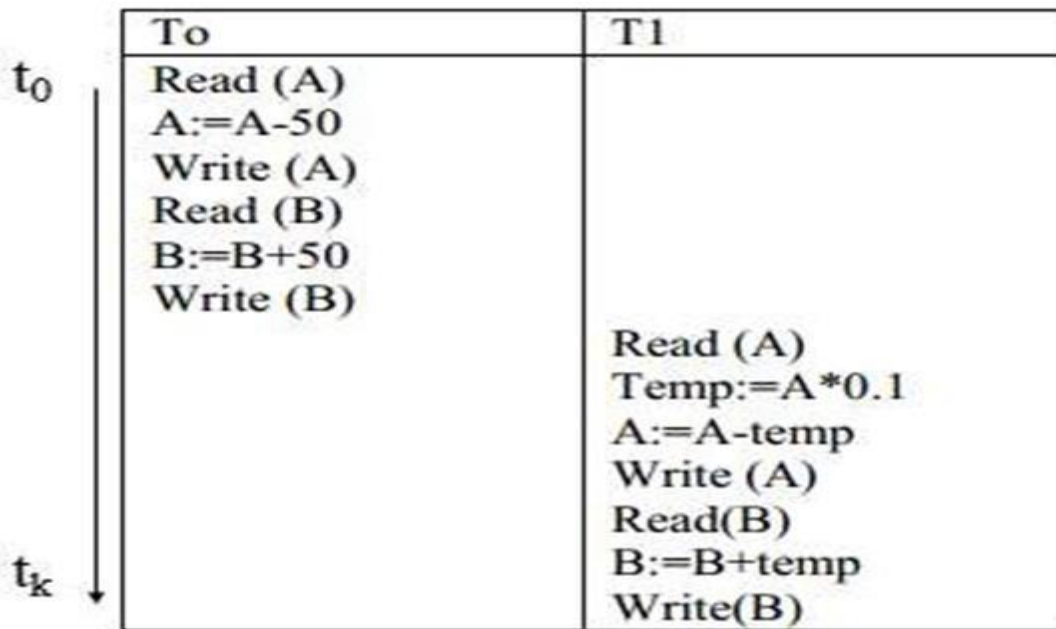
Copy that disk block into a buffer in main memory

Copy item X from the program variable named X into its correct location in the buffer.

Store the updated block from the buffer back to disk (either immediately or at some later point in time).

Transactions Read & Write

Two Transactions



Introduction to Database Administration

TOPIC 226

Concurrent Transactions Examples

Concurrent Transactions Examples

Example of Transactions

Concurrent Transaction

Interleaved & Parallel Processing

Concurrent Processing - An Example

Concurrent Transactions Examples

Concurrent Transaction

In the transaction process, a system usually allows executing more than one transaction simultaneously. This process is called a concurrent execution.

The reasons for wanting to run transactions concurrently are **slow input/output devices** (usually disks) and the presence of **multiple processors** on which different transactions can run at the same time.

Concurrent Transactions Examples

Concurrent Transaction

Informally, if there are two transactions in progress concurrently (**that is, the Begin of one happens between the Begin and the Commit of the other**), we want all the observable effects to be as though all the actions of one transaction happen either before or after all the actions of the other.

Concurrent Transactions Examples

Interleaved & Parallel Processing

Concurrent transactions refer to two or more transactions that appear to users as they are being processed against a database at the same time

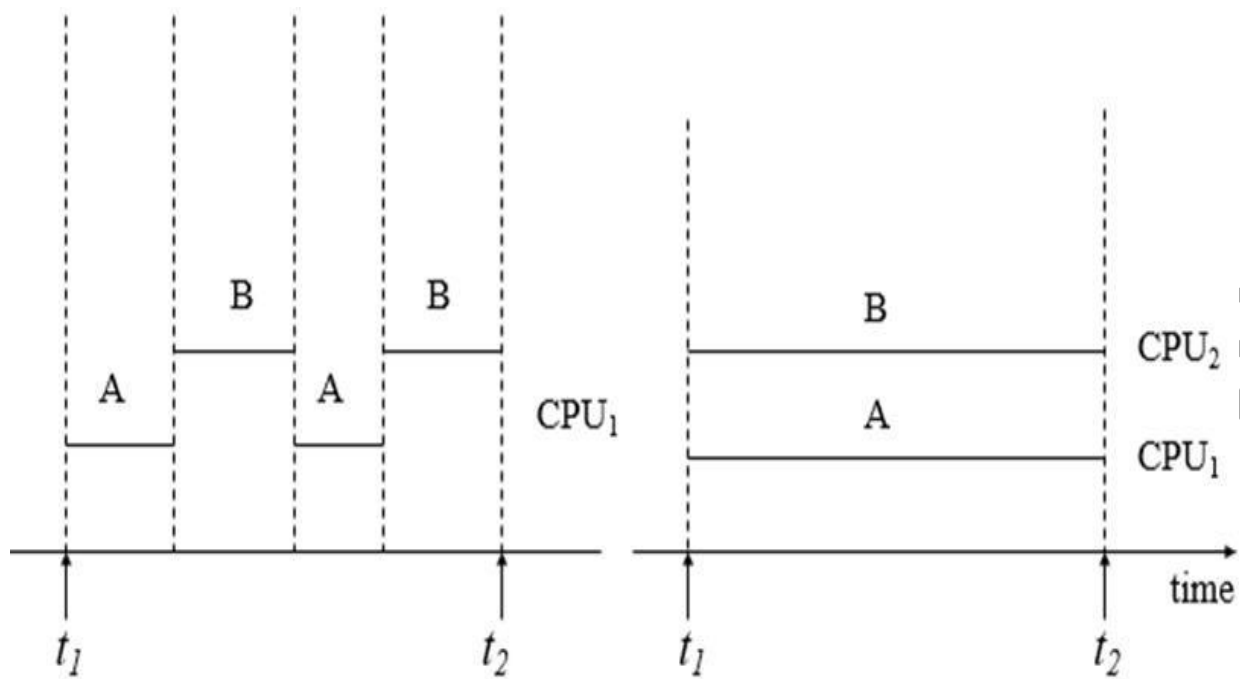
In reality, CPU can execute only one instruction at a time

Transactions are interleaved meaning that the operating system quickly switches CPU services among tasks so that some portion of each of them is carried out in a given interval

Concurrency problems: lost update and inconsistent reads

Concurrent Transactions Examples

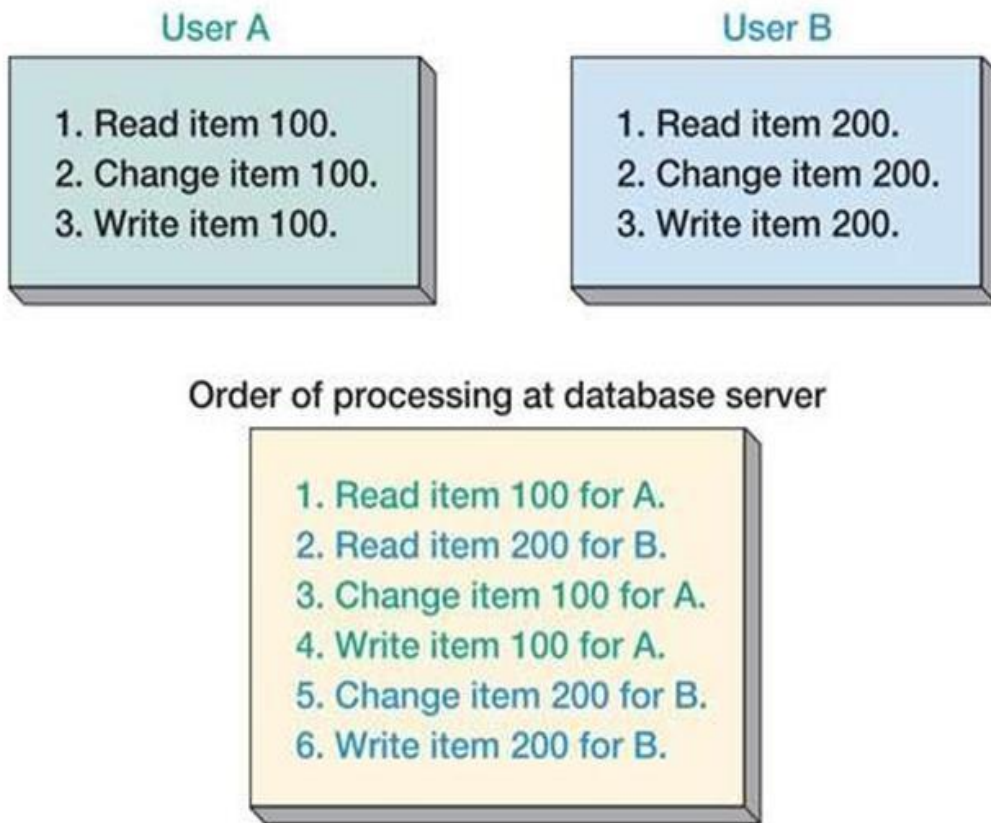
Interleaved & Parallel Processing



Interleaved processing
(Single processor)

Parallel processing
(Two or more processors)

Concurrent Transactions Examples



Concurrent Processing – An Example

Introduction to Database Administration

TOPIC 227

Lost Update Example-1

Lost Update Example-1

Example of Transactions

Concurrency Problems

Lost Update Problems

Lost Update Example-1

Lost Update Example-1

Concurrency Problems

Several problems can occur when concurrent transactions are run in an uncontrolled manner, such type of problems is known as concurrency problems.

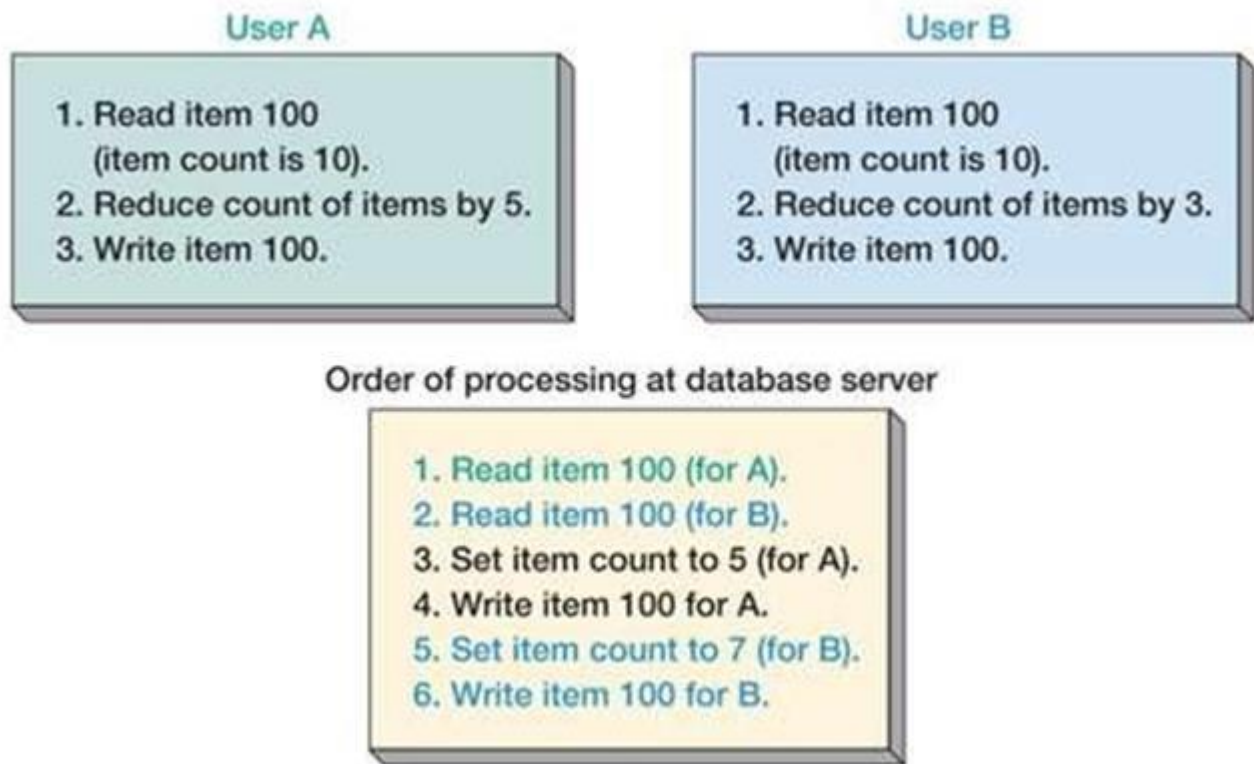
Lost Update Example-1

Lost Update Problems

This type of problem occurs when two transactions in database access the same data item and have their operations in an interleaved manner that makes the value of some database item incorrect.

Lost Update Example-1

Lost Update Example-1



Note: The change and write in steps 3 and 4 are lost.

Lost Update Example-2

Lost Update Example-2

Example of Transactions

Concurrency Problems

Lost Update Problems

Lost Update Example-2

Lost Update Example-2

Concurrency Problems

Several problems can occur when concurrent transactions are run in an uncontrolled manner, such type of problems is known as concurrency problems.

Lost Update Example-2

Lost Update Problems

This type of problem occurs when two transactions in database access the same data item and have their operations in an interleaved manner that makes the value of some database item incorrect.

Lost Update Example-2

Lost Update Example-2

Time	T1	T2	balx
t1		BEGIN	100
t2	BEGIN	read(balx)	100
t3	read(balx)	balx=balx+100	100
t4	balx=balx-10	write(balx)	200
t5	write(balx)	commit	90
t6	commit	END	90
t7	END		

Lost Update Example-2

Lost Update Example-2

Two users are reading a same Item#45667, reading current quantity 120 simultaneously

The image shows two identical-looking windows side-by-side, both titled 'Form1'. The left window is labeled 'Transaction-1' and contains a form for 'User(A)'. It has two input fields: 'Item#' with the value '45667' and 'Quantity' with the value '120'. Below these fields is a 'Save' button. The right window is labeled 'Transaction-2' and contains a form for 'User(B)'. It also has two input fields: 'Item#' with the value '45667' and 'Quantity' with the value '120'. Below these fields is a 'Save' button. Both windows have standard Windows window controls (minimize, maximize, close) in the top right corner.

Introduction to Database Administration

TOPIC 229

Dirty Read Example

Dirty Read Example

Dirty Read Transactions

Dirty Read Problem

Dirty Read Example

Dirty Read Example

Dirty Read Problem

This type of problem occurs when one transaction T1 updates a data item of the database, and then that transaction fails due to some reason, but its updates are accessed by some other transaction.

Dirty Read Example

Dirty Read Example

Time	T3	T4	balx
t1		BEGIN	100
t2		read(balx)	100
t3		balx=balx+100	100
t4	BEGIN	write(balx)	200
t5	read(balx)		200
t6	balx=balx-10	rollback	100
t7	write(balx)	END	190
t8	commit		190
t9	END		

Dirty Read Example

Time	Transaction T1	Transaction T2
t1	Read(A)	
t2	$A = A \cdot 2D$	
t3	Write(4)	
t4		head(A)
t5		$A = A + 30$
t5		Write(A)
t7	Write(B)	

TOPIC 230

Incorrect Summary Problem

Incorrect Summary Problem

Incorrect Summary Problem

Incorrect Summary Problem

Incorrect Summary Problem - An Example

Incorrect Summary Problem

Incorrect Summary Problem

It is also known as an inconsistent retrieval problem. If a transaction

T_1 reads a value of data item twice and the data item is **changed by** another transaction T_2 in between the two read operation. Hence T_1 access two different values for its two read operation of the same data item.

Incorrect Summary Problem

Incorrect Summary Problem – An Example

Time	Transaction T1	Transaction T2
t1	Read(A)	
t2		Read(A)
t3		$A = A + 30$
t4		Write(A)
t5	Read(A)	

Incorrect Summary Problem

Incorrect Summary Problem – An Example

Time	T3	T4	balx	baly	balz	sum
t1		BEGIN	100	50	25	
t2	BEGIN	sum=0				
t3	read(balx)	read(balx)				
t4	balx=balx-10	sum=sum+balx				
t5	write(balx)	read(baly)				
t6	read(balz)	sum=sum+baly				
t7	balz=balz+10					
t8	write(balz)					
t9	commit	read(balz)				
t10	END	sum=sum+balz				
t11		commit				
t12		END				

Introduction to Database Administration

TOPIC 231

Data Inconsistency in Two Invoices

Data Inconsistency in Two Invoices

Data Inconsistency with Multiple Users

Single User in a Retail Store

Retail Store - An Example

Transactions and their Issues

Data Inconsistency in Two Invoices

Single User in a Retail Store

Single user issue an Invoice one at a time
when only one POS terminal is active

When two or more users are issuing invoices, there is a chance of data inconsistency
Data Inconsistency in Two Invoices

Retail Store – An Example

For example, two invoices are issued at
the same time from two POS terminals

What happened multiple invoices are
issued in Multi-user environment
Data Inconsistency in Two Invoices

Transactions and their Issues

Client-I	PHARMACY	Client-II	PHARMACY
Street # 87	Islamabad Tel. (051) 37	Street # 87	Islamabad Tel. (051) 37
DSL# 967/		DSL# 967/	
Bill#: 11799	10-Apr-2019 03:31:43	Bill#: 11799	10-Apr-2019 03:31:53
Name:		Name:	
Med Description	Qty	Price	Amount
PANADOL TAB 200S	10	1.32	13.20
DISPRIN TAB 600S	5	1.60	8.00
Total Qty: 2	Total:		21.2
Salesman: hafiz	Disc.:		0
Paid: 30	Net Total:		21.2
Balance:			8.8
Refrigerator items & cutting strips are not refundable or exchangeable. Disc not applied on non-medicine Please check all items as prescription, Thank You			

Med Description	Qty	Price	Amount
PANADOL SYP NEW	1	78.10	78.10
PANADOL TAB 200S	10	1.32	13.20
DISPRIN TAB 600S	5	1.60	8.00
Total Qty: 3	Total:		99.3
Salesman: hafiz	Disc.:		0
Paid: 100	Net Total:		99.3
Balance:			0.7
Refrigerator items & cutting strips are not refundable or exchangeable. Disc not applied on non-medicine Please check all items as prescription, Thank You			

TOPIC 232

System Failure Problems

System Failure Problems

System Failure Problems

What Can Go Wrong?

System Failure Problems

System Failure Problems

What Can Go Wrong?

System may crash before data is written back to disk

Problem of *atomicity*

Some transaction is modifying shared data while another transaction is ongoing (or vice versa)

Problem of *serialization* and

isolation

System Failure Problems

What Can Go Wrong?

System may not be able to obtain one or more of the data items

System may not be able to write one or more of the data items (Problems of *atomicity*)

DBMS has a Concurrency Control subsystem to assure database remains in consistent state despite concurrent execution of transactions

System Failure Problems

System Failure Problems

System failures may occur Types of failures:

System crash

Transaction or system error

Local errors Concurrency control enforcement

Disk failure Physical failures

DBMS has a Recovery Subsystem to protect database against system failures

Introduction to Database Administration

TOPIC 233

System Log

System Log

System Log

Introduction

System Log

How the Log File is used?

Transaction Log Example

System Log

Introduction

Log or Journal : The log keeps track of all transaction operations that affect the values of database items. This information may be needed to permit recovery from transaction failures. The log is kept on disk, so it is not affected by any type of failure except for disk or catastrophic failure. In addition, the log is periodically backed up to archival storage (tape) to guard against such catastrophic failures.

System Log

Introduction

T refers to a unique transaction-id that is generated automatically by the system and is used to identify each transaction

System Log

System Log

Transaction –id

System log

Multiple record-type file

Log is kept on disk
Periodically backed up
System Log

System Log

Log records
[start_transaction, T]
[write_item, T,X,old_value,new_value]:
[read_item, T,X]
[commit,T]
[abort,T]
[checkpoint]
Commit point of a transaction
System Log

How the Log File is used?

All permanent changes to data are recorded
Possible to undo changes to data
After crash, search log backwards until find last checkpoint
Know that beyond this point, effects of transaction are permanently recorded
System Log

How the Log File is used?

Need to either *redo* or *undo* everything that happened since last checkpoint
Undo: When transaction only partially completed (before crash)
Redo: Transaction completed but we are unsure whether data was written to disk

Transaction Log Example

TransID	Table	RowID	column	Before	After
-----	-----	-----	-----	-----	-----
100	**start**				
100	EMPLOYEE	1005472	Salary	8000	8250
100	PROJECT	1423PRJ	PrjRate	253	256
100	**end committed**				

Introduction to Database Administration

TOPIC 234

Schedules & Recoverability
Schedules & Recoverability

Schedules & Recoverability

Transaction and Schedule
Schedule
Example of Schedule
Schedules & Recoverability

Transaction and Schedule

We have discussed that Multiple transactions can be executed concurrently by interleaving their operations

Schedule

Ordering of execution of operations from various transactions $T_1, T_2, \dots, T_n$ is called a schedule S

Schedules & Recoverability

Schedule

Schedule S of n transactions $T_1, T_2, \dots, T_n$ is an ordering of the operations of the transactions subject to the constraint that, for each transaction T_i that participates in S, the operations of T_i in S must appear in the same order in which they occur in T_i .

Schedules & Recoverability

Example of Schedule

Transaction T_1 : $r_1(X); w_1(X); r_1(Y); w_1(Y); c_1$ Transaction T_2 : $r_2(X); w_2(X); c_2$

A schedule, S:

$r_1(X); r_2(X); w_1(X); r_1(Y); w_2(X); w_1(Y); c_1; c_2$

Introduction to Database Administration

TOPIC 235

Conflicts

Conflicts

Schedule with Conflicts

Conflicts

Conditions for Conflicts

Example of Conflicts

Conflicts

Conflicts

Conflict operations can create inconsistency

Two operations *conflict* if they satisfy ALL three conditions:

they belong to different transactions AND

they access the same item AND

at least one is a

write_item() operation

Conflicts

Conditions for Conflicts

Two operations *conflict* if they satisfy ALL three conditions:
they belong to different transactions AND
they access the same item AND
at least one is a
write_item() operation
Conflicts

Example of Conflicts

S: $r_1(X)$; $r_2(X)$; $w_1(X)$; $r_1(Y)$; $w_2(X)$; $w_1(Y)$;



conflicts

Introduction to Database Administration

TOPIC 236

Serializability

Serializability

Schedule with Serializability

Serializability

Serial Schedule

Characteristics of Serial Schedule

Serializability

Serializability

Serial Schedule
Non-serial schedule
Serializable schedule
Conflict-serializable schedule
View-serializable schedule
Serializability

Serializability

Serial and Non-serial schedule A schedule S is serial if, for every transaction T participating in the

schedule, all the operations of T are executed consecutively in the schedule; otherwise, the schedule is called non-serial

Serializable schedule

A schedule S of n transactions is serializable if it is *equivalent to some serial schedule* of the same n transactions

Serializability

Serial Schedule

Serial schedule is guaranteed correct, should we adopt it?

No, that will be inefficient, under the utilization of resources

Dislike by the users
Serializability

Characteristics of Serial Schedule

Result equivalent: Two schedules are called result equivalent if they produce the same final state of the database.

Conflict equivalent: Two schedules are said to be conflict equivalent if the order of any two conflicting operations is the same in both schedules.

Conflict serializable: A schedule S is said to be conflict serializable if it is conflict equivalent to some serial schedule S' .

End

Introduction to Database Administration

TOPIC 237

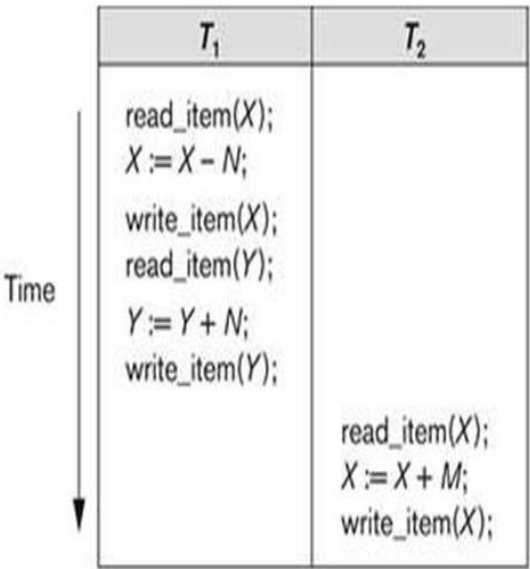
Serial Schedules Example-1

Serial Schedules Example-1

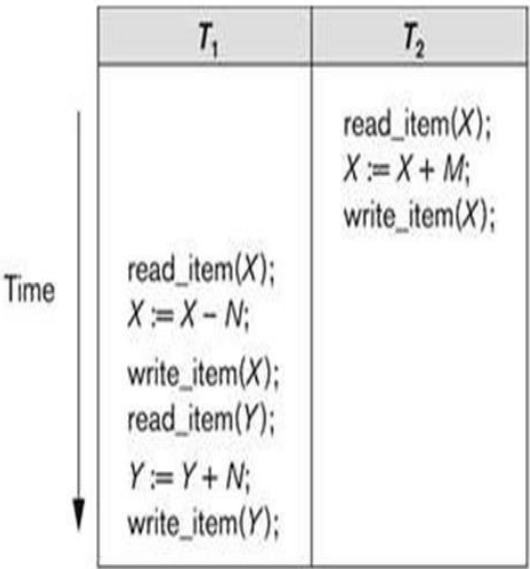
Schedule with Serial Schedules Example-1

Example-1
Serial Schedules Example-1

Example-1



Schedule A



Schedule B

Assume $X=90$, $Y=90$, $N=3$, $M=2$
Introduction to Database Administration

TOPIC 238

Serial Schedules Example-2