DATABASE MANAGEMENT SYSTEMS (IT 2040)

LECTURE 07 – DATABASE UTILITIES

LECTURE CONTENT

- Transferring data between different sources
- Backup and restore of data
- Jobs and job schedules
- Database maintenance plans

LEARNING OUTCOMES

- At the end of this week, students should be able to
  - Transfer data between a data source and a database
  - Create jobs in SQL server
  - Develop a simple database maintenance plan

DATABASE UTILITIES

- Once the database is developed, you may need to perform several tasks on the created tables and stored data.
- SQL server provides many types of utilities for performing commonly used tasks.
- These include,
  - Data Transferring
  - Creating and managing jobs
  - Backup tools & etc.

DATA TRANSFERRING

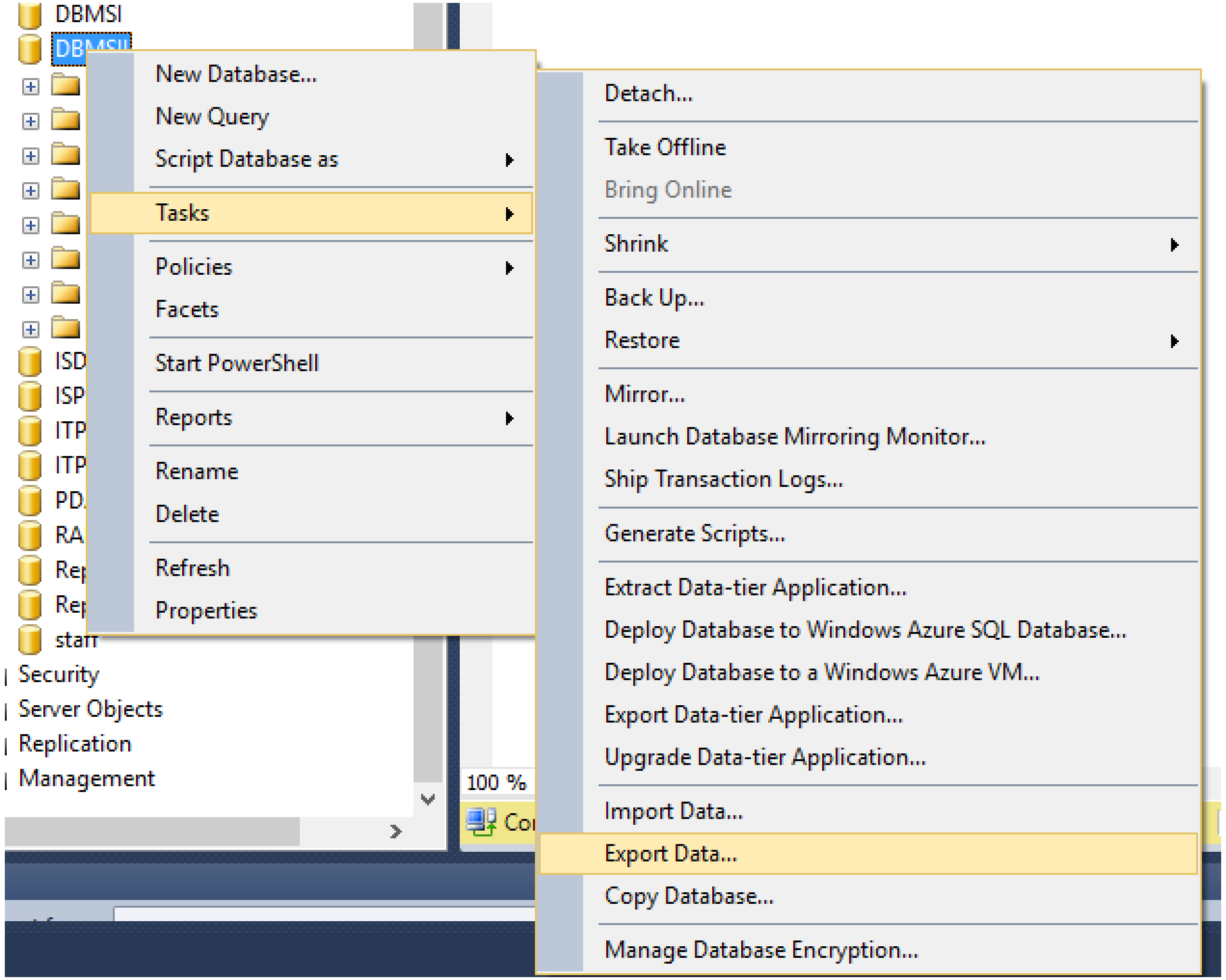
- Some times it is required for transferring data between two sources such as between tables and servers.
- SQL server offers a number of options to facilitate the above as follows :
  - SQL Server Integration Services (SSIS)
  - Using the SQL Server Import and Export Wizard
  - Using BCP to Import and Export Data
  - BULK INSERT
  - SELECT INTO command

SQL SEVER IMPORT AND EXPORT WIZARD

- The SQL sever import and export wizard provides a quick way to move data and perform very light transformations of data.
- The wizard is available in all editions of SQL Server except the Local Database edition and Express.
- Next few slides of the lecture shows how data in an Excel file could be exported to a SQL server table in 5 steps.

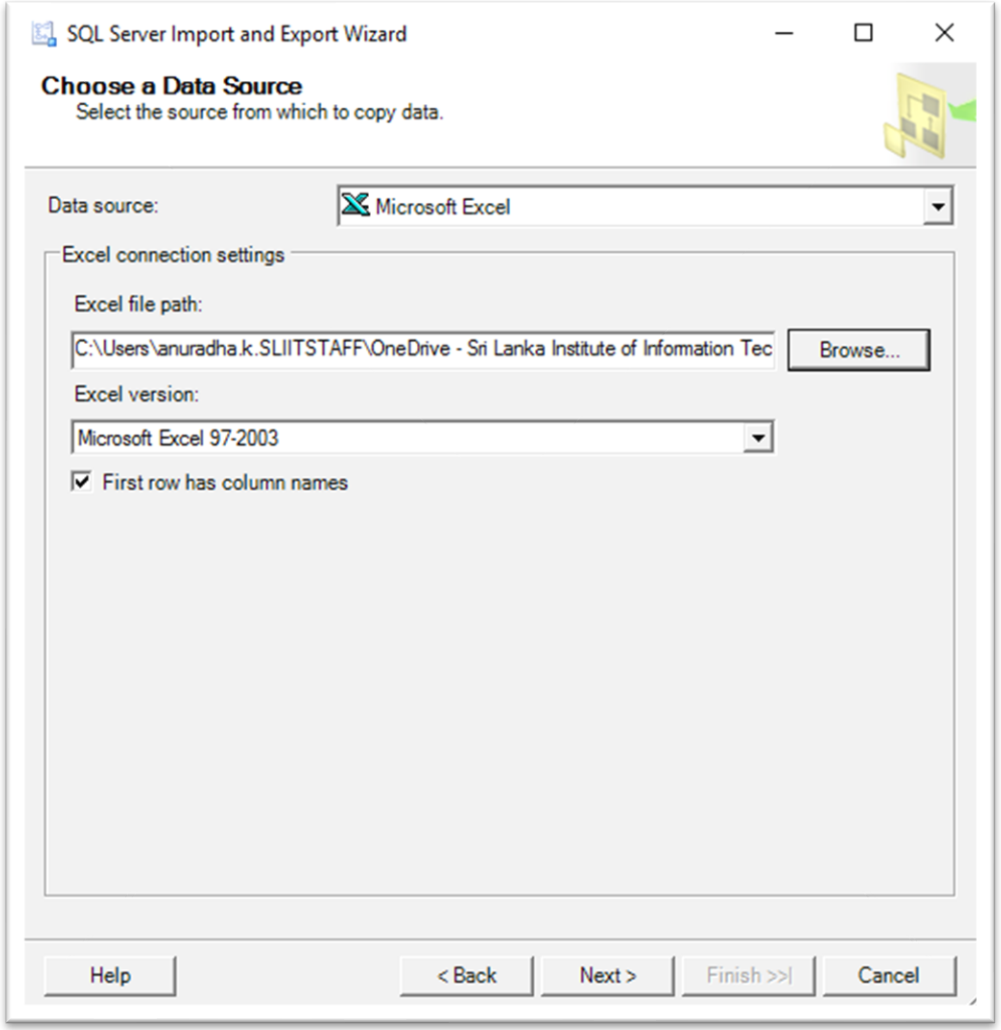
STEP 1 – EXPORTING DATA FROM AN EXCEL FILE

- Log in to the SQL sever
- Right click on a database name and select export data sub menu from the task menu.
- Click Next in the welcome screen which appears.



STEP 2 – EXPORTING DATA FROM AN EXCEL FILE

- On the next screen select the data source.
- In this scenario the data source is an excel file.
- Browse and select the location of the file.
- Tick the check box on the bottom of the screen if the column names are in the first row of the file.
- Click Next.



SQL Server Import and Export Wizard

Choose a Data Source

Select the source from which to copy data.

Data source: Microsoft Excel

Excel connection settings

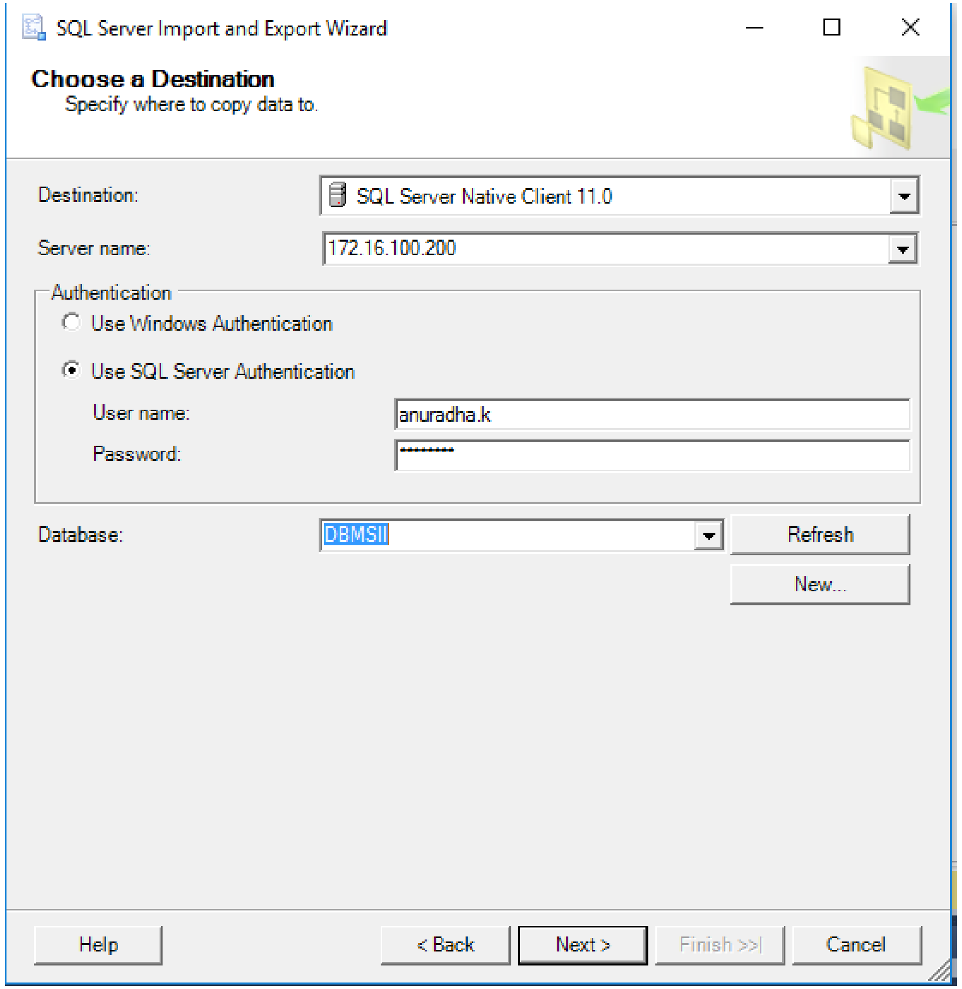
Excel file path: C:\Users\anuradha.k.SLIITSTAFF\OneDrive - Sri Lanka Institute of Information Tec

Excel version: Microsoft Excel 97-2003

☑ First row has column names

STEP 3 – EXPORTING DATA FROM AN EXCEL FILE

- Select the destination for the exported data.
- In this case the destination is the SQL sever database.
- Provide the server name, authentication information and the name of the target database in this screen.
- On the next, select whether all data from a file should be copied or specific data should be drawn through querying.
- In this case all data from the file should be copied.


SQL Server Import and Export Wizard

Choose a Destination
Specify where to copy data to.

Destination: SQL Server Native Client 11.0

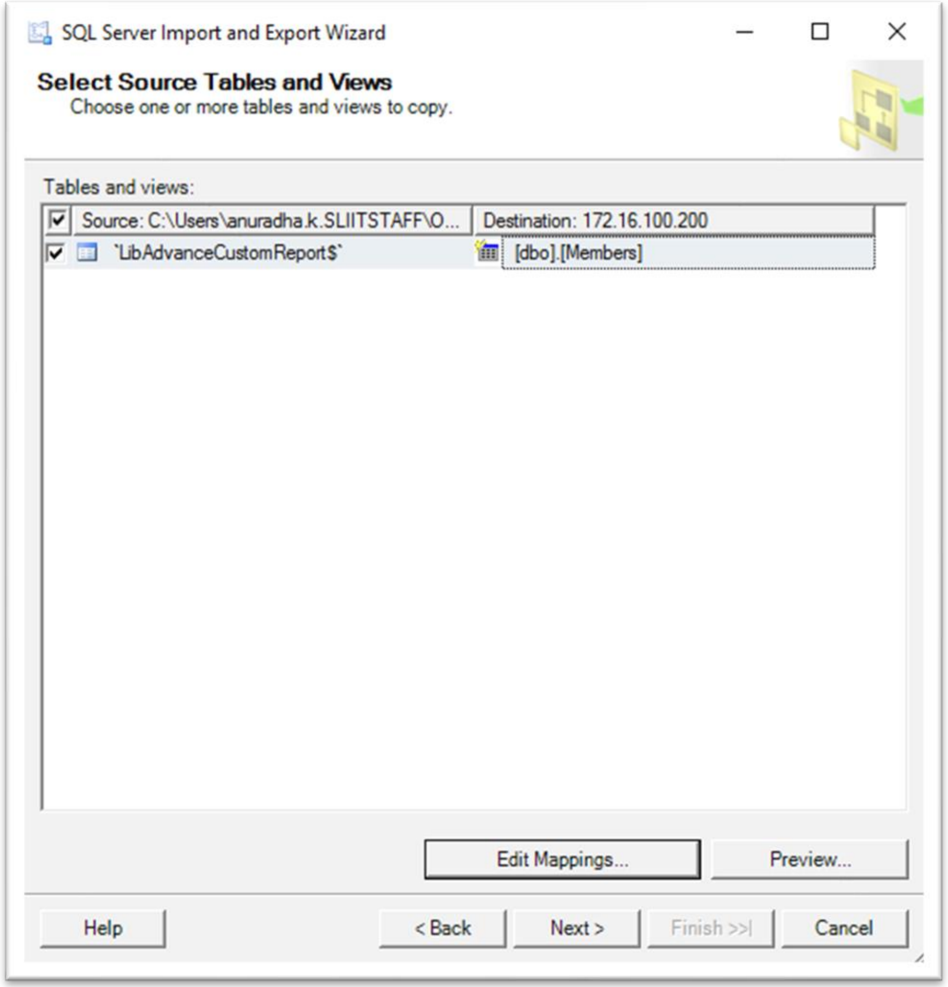
Server name: 172.16.100.200

Authentication
○ Use Windows Authentication
● Use SQL Server Authentication
User name: anuradha.k
Password: *********

Database: DBMSII

STEP 4 – EXPORTING DATA FROM AN EXCEL FILE

- In this screen mapping between the source and destination could be done.
- Change the destination name (i.e. target table name) if it is required.
- Select edit mapping to provide more information on the mapping between the source and the destination
  - Ex: data types of the source table
- Click Next


SQL Server Import and Export Wizard

Select Source Tables and Views

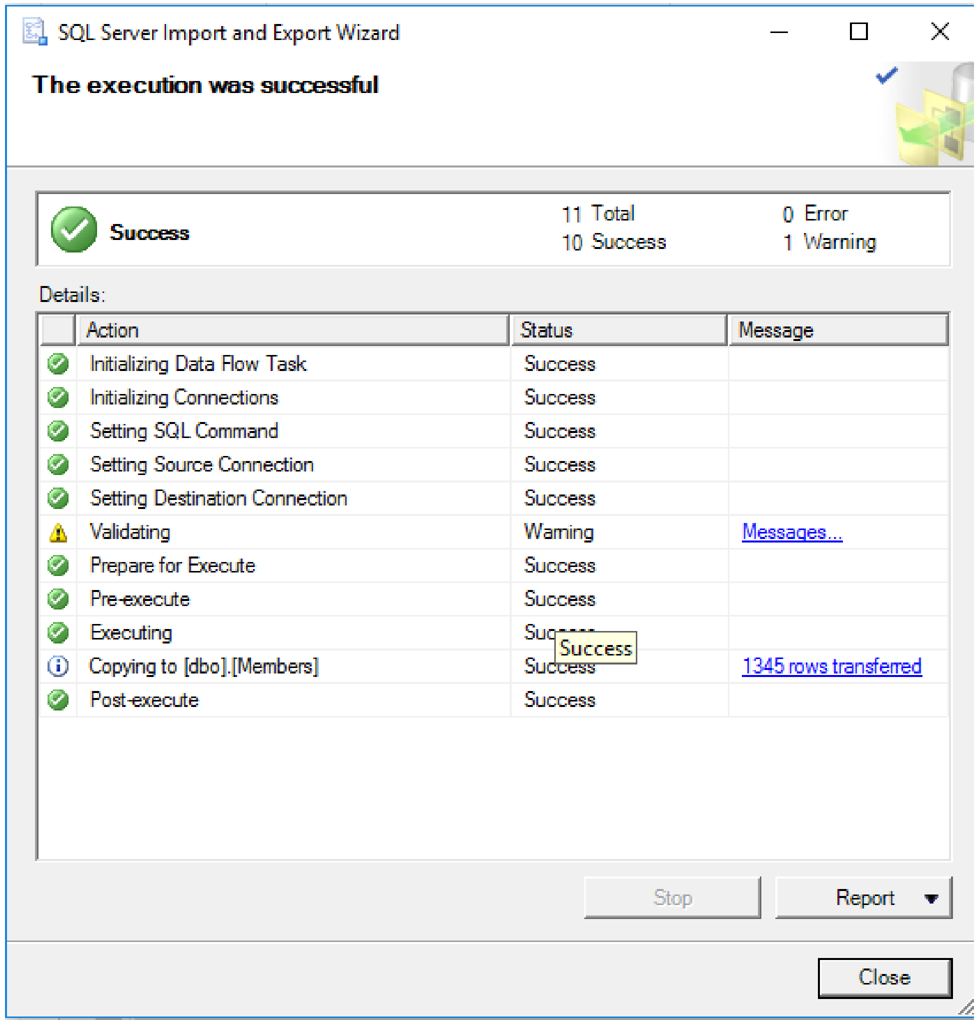
Choose one or more tables and views to copy.

Tables and views:

	Source: C:\Users\anuradha.k.SLIITSTAFF\O...	Destination: 172.16.100.200
☑	`LibAdvanceCustomReport$`	[dbo].[Members]

STEP 5 – EXPORTING DATA FROM AN EXCEL FILE

- Click finish to complete the migration on the next screen.
- Outcome of the data migration process would be displayed as shown on the screen.



SQL Server Import and Export Wizard

The execution was successful

✓ **Success**

11 Total
10 Success

0 Error
1 Warning

Details:

	Action	Status	Message
✓	Initializing Data Flow Task	Success	
✓	Initializing Connections	Success	
✓	Setting SQL Command	Success	
✓	Setting Source Connection	Success	
✓	Setting Destination Connection	Success	
⚠	Validating	Warning	Messages...
✓	Prepare for Execute	Success	
✓	Pre-execute	Success	
✓	Executing	Suc Success	
ⓘ	Copying to [dbo].[Members]	Success	1345 rows transferred
✓	Post-execute	Success	

BCP COMMAND

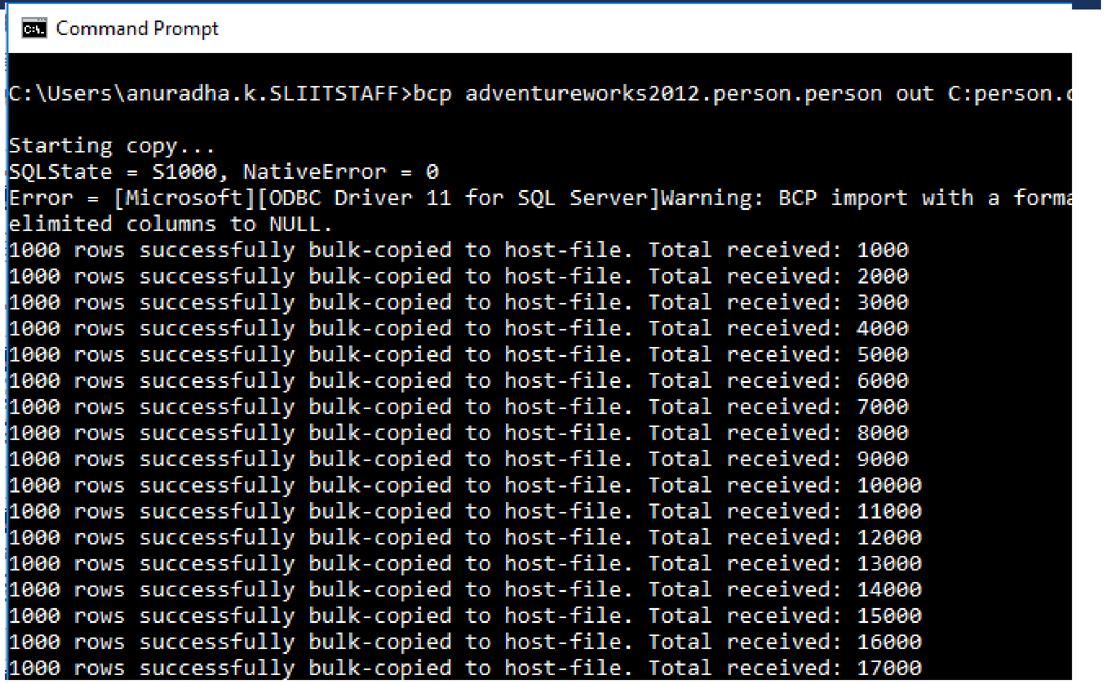
- BCP is a powerful command line utility that enables us to transfer large number of records between a SQL instance and a data file using a special file format.
- This tool is installed by default with SQL Server.
- With BCP the data migrated can be a table or a SQL query result.
- Type BCP command on the command line to obtain the options that could be used with the command.

BCP COMMAND (CONTD.)

- Format of the BCP command is as follows
  - bcp {table|view|"query"} {out|queryout|in|format} {data_file|nul} {[optional_argument]...}
  - Table|view|query represents the source of the data
  - out|queryout|in|format determines the command's mode (direction)
    - Ex: **out option** exports data from a table or view into a data file.
    - Ex: queriyout option exports data retrieved through a query into a data file.
  - *data_file*|nul is the full path of the data file or, when a data file should not be specified, the **nul** value.

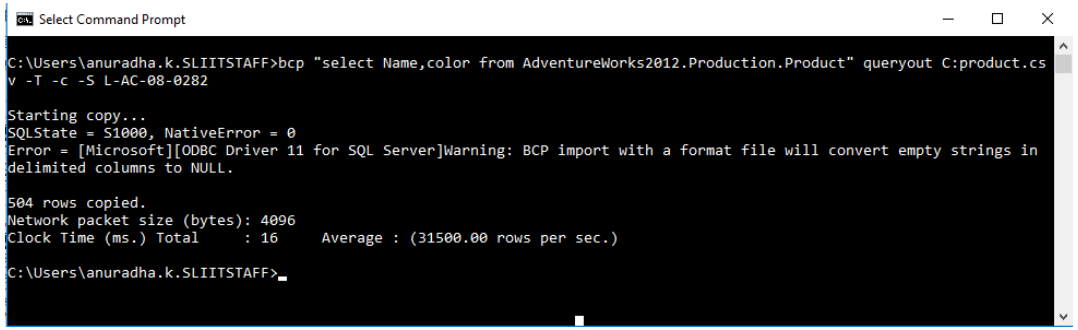
BCP COMMAND – EXAMPLES

- Copying data from a table to a file
  - bcp adventureworks2012.person.person out C:person.csv -T -c -S L-AC-08-0282
  - -c argument is used to perform operations using a character type.
  - -T is used to connect using a Trusted connection (Windows Authentication).
  - -S is used to specify the SQL Server name.
- Exporting data from a SQL Server Query to a file.
  - bcp "select Name,color from AdventureWorks2012.Production.Product" queryout C:product.csv -T -c -S L-AC-08-0282



```
C:\Users\anuradha.k.SLIITSTAFF>bcp adventureworks2012.person.person out C:person.c

Starting copy...
SQLState = S1000, NativeError = 0
Error = [Microsoft][ODBC Driver 11 for SQL Server]Warning: BCP import with a forma
elimited columns to NULL.
1000 rows successfully bulk-copied to host-file. Total received: 1000
1000 rows successfully bulk-copied to host-file. Total received: 2000
1000 rows successfully bulk-copied to host-file. Total received: 3000
1000 rows successfully bulk-copied to host-file. Total received: 4000
1000 rows successfully bulk-copied to host-file. Total received: 5000
1000 rows successfully bulk-copied to host-file. Total received: 6000
1000 rows successfully bulk-copied to host-file. Total received: 7000
1000 rows successfully bulk-copied to host-file. Total received: 8000
1000 rows successfully bulk-copied to host-file. Total received: 9000
1000 rows successfully bulk-copied to host-file. Total received: 10000
1000 rows successfully bulk-copied to host-file. Total received: 11000
1000 rows successfully bulk-copied to host-file. Total received: 12000
1000 rows successfully bulk-copied to host-file. Total received: 13000
1000 rows successfully bulk-copied to host-file. Total received: 14000
1000 rows successfully bulk-copied to host-file. Total received: 15000
1000 rows successfully bulk-copied to host-file. Total received: 16000
1000 rows successfully bulk-copied to host-file. Total received: 17000
```



```
C:\Users\anuradha.k.SLIITSTAFF>bcp "select Name,color from AdventureWorks2012.Production.Product" queryout C:product.cs
v -T -c -S L-AC-08-0282

Starting copy...
SQLState = S1000, NativeError = 0
Error = [Microsoft][ODBC Driver 11 for SQL Server]Warning: BCP import with a format file will convert empty strings in
delimited columns to NULL.

504 rows copied.
Network packet size (bytes): 4096
Clock Time (ms.) Total     : 16     Average : (31500.00 rows per sec.)

C:\Users\anuradha.k.SLIITSTAFF>_
```

BULK INSERT COMMAND

- BULK INSERT loads data from a data file into a table.
- This functionality is similar to that provided by the **in** option of the **bcp** command; however, the data file is read by the SQL Server process.
- Example :

```
BULK INSERT emp2 from "D:\emps.csv"
WITH (
FIELDTERMINATOR = ',',
ROWTERMINATOR = '\n'
)
SELECT * FROM emp2
```

SELECT INTO COMMAND

- SELECT INTO statement copies data from one table to another
- Tables can be on the same SQL Server or linked SQL servers or on different types of servers using distributed queries
- SELECT INTO operates just like Bulk Insert except it can’t read from an external file
- SELECT INTO can also create the destination table automatically before copying the data
- Example :
  - select * into emps from emp2

SECURING DATA WITH BACKUPS

- Backing up your SQL Server databases, protects you from potentially catastrophic data loss.
- With valid backups of a database, you can recover your data from many failures, such as:
  - User errors, for example, dropping a table by mistake.
  - Hardware failures, for example, a damaged disk drive or permanent loss of a server.
  - Natural disasters.

BACKUP AND RESTORE OF DATABASES

- The SQL Server backup and restore component provides an essential safeguard for protecting critical data stored in your SQL Server databases.
- To minimize the risk of catastrophic data loss, you need to back up your databases to preserve modifications to your data on a regular basis.
- A well-planned backup and restore strategy helps protect databases against data loss caused by a variety of failures.

TYPES OF BACKUPS

- Full Backups : Full database backup takes a copy of the entire database including the part of the transaction log file.
- Differential Backups : Differential database backup includes only extents which were changed since the last full database backup.
- Transaction Log Backups :Transaction log backup captures all the transaction log records that have been written after the last full database backup or last transaction log backup.

Demo

JOBS IN SQL SERVER

- A job is a specified series of operations performed sequentially
- Use jobs to define an administrative task that can be run one or more times and monitored for success or failure. A job can run on one local server or on multiple remote servers.
- A job can perform a wide range of activities and can run repetitive or schedulable tasks
- Automatically notify users of job status

RUNNING JOBS IN SQL SERVER

- Jobs can run in several ways:
  - According to one or more schedules.
  - In response to one or more alerts.
  - By executing the sp_start_job stored procedure.
- Jobs can be created by users in several roles including sysadmin user role
- A created job can be edited by only its owners or members of sysadmin role.

SCHEDULES

- A *schedule* specifies when a job runs. More than one job can run on the same schedule, and more than one schedule can apply to the same job. A schedule can define the following conditions for the time when a job runs:
  - Whenever SQL Server Agent starts. (SQL server agent is the component of SQL sever responsible for automation)
  - Whenever CPU utilization of the computer is at a level you have defined as idle.
  - One time, at a specific date and time.
  - On a recurring schedule.

Demo

MAINTENANCE PLANS

- A database maintenance plan is a set of specific, proactive tasks that need to be performed regularly on **databases** to ensure their adequate performance and availability.
- Maintenance Plan Wizard and Designer is to cover those critical database maintenance tasks that, as a bare minimum, should be applied to all databases, to ensure *adequate* performance and availability.

CORE MAINTENANCE PLAN TASKS

- Backup Databases
- Verify the Integrity of Database
- Maintain a Database’s Indexes
- Remove Older Data from msdb
- Remove Old Backups

Demo

Thank you!