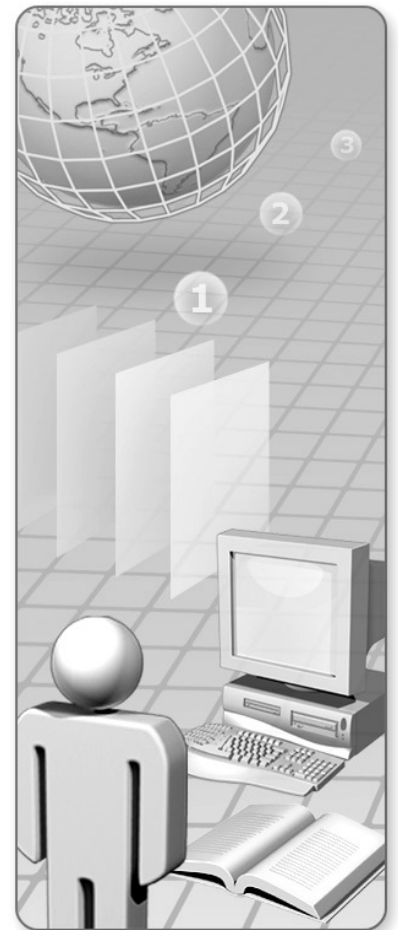


SQLHOL27: SQL Server 2008 DATE/TIME Data Type

Table of Contents

Before You Begin	1
Exercise1: Exploring DATE and TIME datatypes	3
Exercise 2: Working with DATE and TIME datatypes	7



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Before You Begin

Estimated time to complete this lab

40 minutes

Objectives

After completing this lab, you will be able to:

- Work with Change Data Capture in SQL Server 2008

Prerequisites

Before working on this lab, you must have:

- Experience of Transact-SQL programming and SQL Server Management Studio.

Lab scenario

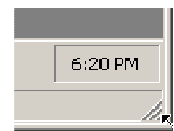
In this lab you will identify the limitations of working with date and time data in previous editions of SQL Server 2005. You will identify the new datatypes and new functions that release with SQL Server 2008 and make modifications to existing data by modifying database structures, and implementing date/time best practices.

Virtual PC

This lab makes use of Microsoft Virtual PC 2007, which is an application that allows you to run multiple virtual computers on the same physical hardware. During the lab, you will use a virtual machine running Microsoft Windows Server® 2003.

Before you start the lab, familiarize yourself with the following basics of Virtual PC:

- To switch the focus for your mouse and keyboard to the virtual machine, click inside the virtual machine window.
- To remove the focus from a virtual machine, move the mouse pointer outside the virtual machine window.
- To mimic the CTRL+ALT+DELETE key combination inside a virtual machine, use <RIGHT>ALT+DEL. In Virtual PC, the <RIGHT>ALT key is called the host key.
- To enlarge the size of the virtual machine window, drag the lower-right corner of the window as seen in the screenshot.



- To switch to and from full-screen mode, press <RIGHT>ALT+ENTER.

Computers in this lab

This lab uses one computer as described in the following table. Before you begin the lab, you must start the virtual machines and then log on to the computer. In each exercise, you only have to start the virtual machine that is needed.

Virtual Machine	Computer Name	User Name	Password
SQL Server 2008 HOLs	MIAMI	Student	Pa\$\$w0rd

Start the Virtual Machine

1. Launch Microsoft Virtual PC from the Start menu or Desktop. If the Virtual PC Console does not appear, look for its icon in the System Tray, and double-click the Microsoft Virtual PC icon in the System Tray.
2. Select **SQL Server 2008 HOLs** and click **Start**.
3. When the virtual server is running, on the **Action** menu within the virtual server window, click **Ctrl+Alt+Del** (or press **Right Alt+Del** on your keyboard) to send a Ctrl+Alt+Del sequence to the login dialog box within the virtual server window.
4. Type the following information, and then click OK:
 - User name: **Student**
 - Password: **Pa\$\$w0rd**

Exercise1: Exploring DATE and TIME datatypes

In SQL Server 2008 additional support for date and time data is provided by the introduction of new datatypes.

The introduction of these new datatypes allow you to better store and work with date and time data, including multiple time zones and enhanced date calculations.

The new datatypes consist of:

- datetime2
- date
- time
- datetimeoffset

Start SQL Server Management Studio

1. Click **Start | All Programs | Microsoft SQL Server 2008 | SQL Management Studio** to start SQL Server Management Studio.
2. Click **Connect** in the **Connect to Server** dialog box after ensuring the following settings:
 - Server type: Database Engine
 - Server name: (local)
 - Authentication: Windows Authentication
3. Click on **'File | Open | File.**
4. Browse to the C:\SQHOLS folder and open the Labscrip.sql file in the Date Time Datatype folder

Create Lab Database and review Datatypes

1. Review and **Highlight** the following code and click **Execute**:

```
CREATE DATABASE LABDB  
GO
```

2. Review and **Highlight** the following code and click **Execute**:

```
select * from sys.systypes where name like '%date%' or name like '%time%'
```

The query result will look similar as in the picture below

	name	xtype	status	xusertype	length	xprec	xscale	tdefault	domain	uid	reserved	collationid	usertype	variable	allownull
1	date	40	0	40	3	10	0	0	0	4	0	NULL	0	0	1
2	time	41	0	41	5	16	7	0	0	4	0	NULL	0	0	1
3	datetime2	42	0	42	8	27	7	0	0	4	0	NULL	0	0	1
4	datetimeoffset	43	0	43	10	34	7	0	0	4	0	NULL	0	0	1
5	smalldatetime	58	0	58	4	16	0	0	0	4	0	NULL	22	0	1
6	datetime	61	0	61	8	23	3	0	0	4	0	NULL	12	0	1
7	timestamp	189	1	189	8	0	0	0	0	4	0	NULL	80	0	0

3. Review and **Highlight** the following code and click **Execute**:

```
USE LABDB
GO
CREATE TABLE TBL_NewDatetimetypes (DateValue date, Timevalue Time, DateTimeOffset
datetimeoffset, Datetime2value datetime2)
```

4. Review and **Highlight** the following code and click **Execute**:

```
USE LABDB
GO
INSERT INTO TBL_NewDatetimetypes values
(SYSDATETIME(), SYSDATETIME(), SYSDATETIMEOFFSET(), SYSUTCDATETIME())
```

Note: The above statement is using the following functions:

SYSDATETIME - Returns the current database system timestamp as a datetime2(7) value. The database time zone offset is not included. This value is derived from the operating system of the computer on which the instance of SQL Server is running.

SYSDATETIMEOFFSET - Returns the current database system timestamp as a datetimeoffset(7) value. This value is derived from the operating system of the computer on which the instance of SQL Server is running. SYSDATETIME and SYSUTCDATETIME have more fractional seconds precision than GETDATE and GETUTCDATE. SYSDATETIMEOFFSET includes the system time zone offset. SYSDATETIME, SYSUTCDATETIME, and SYSDATETIMEOFFSET can be assigned to a variable of any of the date and time types.

SYSUTCDATETIME - Returns the current database system timestamp as a datetime value. The database time zone offset is not included. This value represents the current UTC time (Coordinated Universal Time). This value is derived from the operating system of the computer on which the instance of SQL Server is running.

5. Review and **Highlight** the following code and click **Execute**:

```
USE LABDB
GO
```

```
INSERT INTO TBL_NewDatetimetypes values
(SYSDATETIME(),SYSDATETIME(),SYSDATETIMEOFFSET(),SYSUTCDATETIME())
```

The query result will look similar as in the picture below

	DateValue	TimeValue	DateTimeOffsetValue	Datetime2Value
1	2007-08-28	15:06:42.6575720	2007-08-28 15:06:42.6575720 -07:00	2007-08-28 22:06:42.6575720

Understanding the stored data

Based on the previous query results you should understand that the new datatypes in SQL Server support the following storage:

Data type	Format	Range	Accuracy	Storage size (bytes)	User-defined fractional second precision	Time zone offset
time	hh:mm:ss [.nnnnnnn]	00:00:00.0000000 through 23:59:59.9999999	100 nanoseconds	3 to 5	Yes	No
date	YYYY-MM-DD	00001-01-01 through 9999-12-31	1 day	3	No	No
smalldatetime	YYYY-MM-DD hh:mm:ss	1900-01-01 through 2079-06-06	1 minute	4	No	No
datetime	YYYY-MM-DD hh:mm:ss [.nnn]	1753-01-01 through 9999-12-31	0.333 second	8	No	No
datetime2	YYYY-MM-DD hh:mm:ss [.nnnnnnn]	0001-01-01 00:00:00.0000000 through 9999-12-31 23:59:59.9999999	100 nanoseconds	6 to 8	Yes	No
datetimeoffset	YYYY-MM-DD hh:mm:ss [.nnnnnnn] [+ -] hh:mm	00001-01-01 00:00:00.0000000 through 9999-12-31 23:59:59.9999999 (in UTC)	100 nanoseconds	8 to 10	Yes	Yes

6. Review and **Highlight** the following code and click **Execute**:

```
USE LABDB
Create table tbl_timezones (Entryid int identity(1,1),
                          Currenttime datetimeoffset)
GO
insert into tbl_timezones (currenttime)
values ('1998-09-20 7:45:50.71345 -5:00')
insert into tbl_timezones (currenttime)
values ('1956-01-27 6:45:50.00000 -3:00')
insert into tbl_timezones (currenttime)
values ('1972-12-18 7:45:50.71345 +1:00')
insert into tbl_timezones (currenttime)
```

```
values ('2005-01-20 7:12:50.71345 +9:00')
insert into tbl_timezones (currenttime)
values ('2005-01-20 01:00:00.00000 +4:00')
```

Note: The datetimeoffset datatype allows you to store the timezone identifier together with the date value.

7. Review and **Highlight** the following code and click **Execute**:

```
select datepart(TZoffset,sysdatetimeoffset())
```

Note: Depending on the server timezone settings this will return the value in minutes from the GMT standard time.

This will be -420 for PST, 60 for GMT+1

The DATEPART function has been extended to return the timezone value from a given timezone, the TZoffset value is returned in a number, representing the number in minutes from GMT standard time. So PST (GMT - 7) will return the value of -420.

8. Review and **Highlight** the following code and click **Execute**:

```
USE LABDB
select currenttime,SWITCHOFFSET ( currenttime,
datepart(TZoffset,sysdatetimeoffset())) as TimeinCurrentTimezone
from tbl_timezones)
```

The query result will look similar to:

	currenttime	TimeinCurrentTimezone
1	1998-09-20 07:45:50.7134500 -05:00	1998-09-20 05:45:50.7134500 -07:00
2	1956-01-27 06:45:50.0000000 -03:00	1956-01-27 02:45:50.0000000 -07:00
3	1972-12-18 07:45:50.7134500 +01:00	1972-12-17 23:45:50.7134500 -07:00
4	2005-01-20 07:12:50.7134500 +09:00	2005-01-19 15:12:50.7134500 -07:00
5	2005-01-20 01:00:00.0000000 +04:00	2005-01-19 14:00:00.0000000 -07:00

Exercise 2: Working with DATE and TIME datatypes

In this exercise you will identify some limitations of the datetime and smalldatetime datatype in previous editions of SQL Server and you will take corrective actions to address those limitations.

1. Click Start | All Programs | Microsoft SQL Server code name Katmai | SQL Server Management Studio menu.
2. Click **Connect** in the **Connect to Server** dialog box after ensuring the following settings:
 - Server type: Database Engine
 - Server name: (local)
 - Authentication: Windows Authentication

Create a table to work with the datatypes

1. Review and **Highlight** the following code and click **Execute**:

```
USE LABDB
GO
if object_id('tbl_historicalEvents') is not null
drop table tbl_historicalEvents

create table tbl_historicalEvents (EventID int IDENTITY (1,1),
                                Eventname nvarchar(200), Eventdate datetime)
```

2. Review and **Highlight** the following code and click **Execute**:

```
USE LABDB
insert into tbl_historicalEvents (Eventname, Eventdate)
values ('Birthday of Wolfgang Amadeus Mozart', '01/27/1756')

insert into tbl_historicalEvents (Eventname, Eventdate)
values ('Universal declaration of Human Rights', '12/10/1948')
insert into tbl_historicalEvents (Eventname, Eventdate)
values ('Birthday of Johan Sebastian Bach', '03/21/1685')
```

Note: The last statement will fail with the following error

Msg 242, Level 16, State 3, Line 17
The conversion of a varchar data type to a datetime data type resulted in an out-of-range value.

Note: This error occurs because the date value you are trying to insert falls outside the scope of the datetime datatype. (01-01-1753 through 9999-12-31)

3. Review and **Highlight** the following code and click **Execute**:

```
USE LABDB
GO
if object_id('tbl_historicalEvents') is not null
drop table tbl_historicalEvents

create table tbl_historicalEvents (EventID int IDENTITY (1,1),
                                Eventname nvarchar(200),
                                Eventdate date)
```

4. Review and **Highlight** the following code and click **Execute**:

```
USE LABDB
insert into tbl_historicalEvents (Eventname, Eventdate)
values ('Birthday of Wolfgang Amadeus Mozart', '01/27/1756')
insert into tbl_historicalEvents (Eventname, Eventdate)
values ('Universal declaration of Human Rights', '12/10/1948')
insert into tbl_historicalEvents (Eventname, Eventdate)
values ('Birthday of Johan Sebastian Bach', '03/21/1685')
```

Note: You will now notice that the last insert runs successfully because of the date datatype.

5. Close all applications and do not save changes.
6. Close Virtual PC and discard changes.