

## LAB #9

### Server Automation. Using SQL server agent. Managing alerts. Managing operators.

SQL Server Agent service is responsible for processing alerts and running scheduled jobs. When alerts are triggered and when scheduled jobs fail, succeed, or finish, you can notify SQL Server operators. Operator notifications are also processed through SQL Server Agent. The SQL Server Agent service executes scheduled jobs, triggers alerts, and performs other automated tasks. Using alerts, you can send email or pager alerts when errors occur.

A pager (also known as a beeper, bleeper or pocket bell) is a wireless telecommunications device that receives and displays alphanumeric or voice messages. One-way pagers can only receive messages, while response pagers and two-way pagers can also acknowledge, reply to and originate messages using an internal transmitter. Pagers were developed in the 1950s and 1960s, and became widely used by the 1980s. In the 21st century, the widespread availability of cellphones and smartphones has greatly diminished the pager industry. Nevertheless, pagers continue to be used by some emergency services and public safety personnel, because modern pager systems' coverage overlap, combined with use of satellite communications, can make paging systems more reliable than terrestrial-based cellular networks in some cases, including during natural and man-made disasters. This resilience has led public safety agencies to adopt pagers over cellular and other commercial services for critical messaging.

### Managing operators

We can use the **sp\_add\_operator** system stored procedure to create an operator. It's syntax:

```
sp_add_operator [ @name = ] 'name_of_operator'  
[ , [ @enabled = ] activity ]  
[ , [ @email_address = ] 'email_address' ]  
[ , [ @pager_address = ] 'pager_address' ]  
[ , [ @weekday_pager_start_time = ] weekday_pager_start_time ]  
[ , [ @weekday_pager_end_time = ] weekday_pager_end_time ]  
[ , [ @pager_days = ] pager_days ]
```

Consider the arguments:

- **activity**. The current status of the operator. The default value is 1, which means that the operator is active and will receive the notification. If this value is 0, then the operator is not active and it will not receive the notification.
- **'email'**. Email address.
- **'pager\_address'**. Pager address is nvarchar(100), with a default of NULL.
- **weekday\_pager\_start\_time**. The time, after which expiration SQLServerAgent sends a notification on the pager to the operator on its working days. The default value is 090000 (9 am). Its syntax is: HHMMSS. The maximum value is 23:59:59.
- **weekday\_pager\_end\_time**. The time, after which expiration SQLServerAgent do not sends a notification on the pager to the operator on its working days. The default value is 180000 (6 pm). Its syntax is: HHMMSS. The maximum value is 23:59:59.

- ***pager\_days***. The number, that specifies the days when the operator is available to receive notification on the pager. The default value is 0, that is, the operator is not available. Valid values:  $0 \div 127$ . If we want that the operator receive notifications on certain days, we must add the corresponding numbers. For example, if we want that the operator receive notifications from Monday to Friday, then we must add the following numbers:  $2 + 4 + 8 + 16 + 32 = 62$ . The values of the arguments are given in table 8.1.

Table 8.1.

| Value | Description |
|-------|-------------|
| 1     | Sunday      |
| 2     | Monday      |
| 4     | Tuesday     |
| 8     | Wednesday   |
| 16    | Thursday    |
| 32    | Friday      |
| 64    | Saturday    |

**Create the operator Operator\_5, which will be sent a notification on E-mail and pager from Tuesday to Thursday from 01:39 to 23:29. Operator\_5 is active:**

```
use msdb;
exec sp_add_operator @name = 'Operator_5',
@enabled = 1,
@email_address = 'Operator_5@mymail.ge',
@pager_address = N'1234567RS@pager.IBSU.ge',
@weekday_pager_start_time = 013000,
@weekday_pager_end_time = 232900,
@pager_days = 28;
```

**Create the operator Operator\_51, which will be sent a notification on E-mail on Monday and Saturday from 08:08 to 03:02. The operator is not active:**

```
use msdb;
exec sp_add_operator @name = 'Operator_51',
@enabled = 0,
@email_address = 'Operator_51@mymail.ge',
@weekday_pager_start_time = 080800,
@weekday_pager_end_time = 030200,
@pager_days = 66;
```

**Create the operator Operator\_52, which will be sent a notification on pager on Wednesday from 11:03 to 14:21. The operator is active:**

```
use msdb;  
exec sp_add_operator @name = 'Operator_52',  
@enabled = 1,  
@pager_address = 'Operator_51@pager.IBSU.ge',  
@weekday_pager_start_time = 110300,  
@weekday_pager_end_time = 142100,  
@pager_days = 8;
```

**Change status of the operator Operator\_5 so, that he (she) can receive notifications only on E-mail on Tuesday and Friday from 23:32 to 10:31. Disable this operator:**

```
USE msdb;  
EXEC sp_update_operator @name = 'Operator_5',  
@enabled = 0,  
@email_address = 'Operator_5@mymail.ge',  
@pager_address = '',  
@weekday_pager_start_time = 233200,  
@weekday_pager_end_time = 103100,  
@pager_days = 36;
```

**Change status of the operator Operator\_51 so, that he (she) can receive notifications only on pager on Sunday from 14:32 to 02:23. Enable this operator:**

```
USE msdb;  
EXEC sp_update_operator @name = 'Operator_51',  
@enabled = 1,  
@email_address = '',  
@pager_address = 'Operator_51@pager.IBSU.ge ',  
@weekday_pager_start_time = 143200,  
@weekday_pager_end_time = 022300,  
@pager_days = 1;
```

**Change status of the operator Operator\_52 so, that he (she) can receive notifications on E-mail and pager from Wednesday to Saturday from 15:33 to 03:33. Disable this operator:**

```
USE msdb;  
EXEC sp_update_operator @name = 'Operator_52',  
@enabled = 0,  
@email_address = 'Operator_52@mymail.ge',  
@pager_address = 'Operator_52@pager.IBSU.ge',  
@weekday_pager_start_time = 153300,  
@weekday_pager_end_time = 033300,  
@pager_days = 120;
```

**Delete the operator Operator\_52:**  
USE msdb;  
EXEC sp\_delete\_operator 'Operator\_52';

## Managing alerts

The alert can be created by using the **sp\_add\_alert** system stored procedure. It's syntax:

```
sp_add_alert [ @name = ] 'alert_name'  
[ , [ @message_id = ] message_id ]  
[ , [ @severity = ] severity ]  
[ , [ @enabled = ] activity ]  
[ , [ @delay_between_responses = ] delay ]  
[ , [ @notification_message = ] 'notification_message' ]  
[ , [ @include_event_description_in = ] include_event_description ]  
[ , [ @database_name = ] 'database' ]  
[ , [ @job_name = ] 'job_name' ]
```

Consider the arguments.

- '**alert\_name**'. The name of the alert. The name appears in the e-mail or pager message sent in response to the alert. It must be unique.
- **message\_id**. The number of an error.
- **severity**. The level of severity (from 1 through 25) that defines the alert.
- **activity**. Is used to activate an alert. The default value is 1 (alert is active).
- **delay**. The wait period, in seconds, between responses to the alert.
- '**notification\_message**'. The message of notification, that will be included into message which will be send to the operator.
- **include\_event\_description**. Whether the description of the SQL Server error should be included as part of the notification message. Can have one or more of these values combined with an OR logical operator:
  - 0 – An error text will not be included in a message that should be sent;
  - 1 - An error text will be included in a message that should be sent by email;
  - 2 - An error text will be included in a message that should be sent on pager;
- '**database**'. The database in which the error must occur for the alert to fire. If *database* is not supplied, the alert fires regardless of where the error occurred. Names that are enclosed in brackets ([ ]) are not allowed. The default value is NULL.
- '**job\_name**'. The name of the job to be executed in response to this alert. The default is NULL.

**Create the alert Alert\_1. The alert is active. The severity level is 020. The delay between responses is 35 minutes. An error text will not be included in a message. Define the notification message:**

```
USE msdb;  
EXEC sp_add_alert @name = 'Alert_1',  
@enabled = 1,  
@severity = 020,  
@delay_between_responses = 2100,  
@include_event_description_in = 0,  
@notification_message = N'There is an error_1';
```

**Create the alert Alert\_2. The alert is not active. The error number is 9006. The delay between responses is 40 minutes. An error text will be included in a message that should be sent by email. Define the notification message:**

```
USE msdb;  
EXEC sp_add_alert @name = 'Alert_2',  
@enabled = 0,  
@message_id = 9006,  
@delay_between_responses = 2400,  
@include_event_description_in = 1,  
@notification_message = N'There is an error_2';
```

**Create the alert Alert\_3. The alert is active. The severity level is 025. The delay between responses is 50 minutes. An error text will be included in a message that should be sent on pager. Define the notification message:**

```
USE msdb;  
EXEC sp_add_alert @name = 'Alert_3',  
@enabled = 1,  
@severity = 025,  
@delay_between_responses = 3000,  
@include_event_description_in = 2,  
@notification_message = N'There is an error_3';
```

**Create the alert Alert\_4. The alert is not active. The severity level is 024. The delay between responses is 45 minutes. An error text will be included in a message that should be sent on pager. Define the notification message. The error must occur in the Base\_4 database for the alert to fire:**

```
USE msdb;  
EXEC sp_add_alert @name = 'Alert_4',  
@enabled = 0,  
@severity = 024,  
@delay_between_responses = 2700,  
@include_event_description_in = 2,  
@notification_message = N'There is an error_4',  
@database_name = N'Base_4';
```

**Create a Job\_1 job and connect it to the SQL Server. Associate the alert Alert\_1 with the job Job\_1:**

```
USE msdb;  
EXEC sp_add_job @job_name = N'Job_1';  
EXEC sp_add_jobserver @job_name = N'Job_1',  
@server_name = N'ROMANI\SQL_2012';
```

```
EXEC sp_update_alert @name = N'Alert_1',  
                    @job_name = N'Job_1';
```

**Create a Job\_5 job and connect it to the SQL Server. Create the Alert\_5 alert. The alert is active. The error number is 9005. The delay between responses is 46 minutes. An error text will be included in a message that should be sent by email. Define the notification message. The Job\_5 job be executed in response to this alert:**

```
USE msdb;  
EXEC sp_add_job @job_name = N'Job_5';  
EXEC sp_add_jobserver @job_name = N'Job_5',  
                    @server_name = N'ROMANT\SQL_2012';  
EXEC sp_add_alert @name = 'Alert_5',  
@enabled = 1,  
@message_id = 9005,  
@delay_between_responses = 2760,  
@include_event_description_in = 1,  
@notification_message = N'There is an error_5',  
@job_name = N'Job_5';
```

**Change the error number of the alert Alert\_2. The new value is 9009. Activate this alert:**

```
EXEC dbo.sp_update_alert  
    @name = N'Alert_2',  
    @enabled = 1,  
    @message_id = 9009,  
    @severity = 0;
```

**Change the severity level of the alert Alert\_3. The new value is 022. Disable this alert:**

```
EXEC dbo.sp_update_alert  
    @name = N'Alert_3',  
    @enabled = 0,  
    @severity = 022;
```

**Change the time delay between the occurrence of an event of the alert Alert\_3. The new value is 55 seconds. An error text will be included in a message that should be sent by email:**

```
EXEC dbo.sp_update_alert  
    @name = N'Alert_3',  
    @include_event_description_in = 1,  
    @delay_between_responses=55;
```

**Change the database and the notification message of the Alert\_4 alert. The new notification message is - „There is an error“. The error must occur in the Base\_44 database for the alert to fire:**

```
EXEC dbo.sp_update_alert  
    @name = N'Alert_4',  
    @notification_message = N'There is an error_44',  
    @database_name = N'Base_44';
```

**Change the job associated with the Alert\_5 alert. The new job is Job\_55. This job be executed in response to this alert:**

```
EXEC dbo.sp_update_alert  
    @name = N'Alert_5',  
    @job_name = N'Job_55';
```

**Delete the Alert\_2 alert:**

```
EXEC dbo.sp_delete_alert  
@name = N'Alert_2';
```



### **Exercises.**

1. Create the Operator\_2 operator, which will be sent a notification only on E-mail from Tuesday to Thursday from 7:00 to 16:00.
2. Change status of the Operator\_2 operator so, that he (she) can receive notifications only on pager from Monday to Wednesday from 10 am to 7 pm.
3. Disable the Operator\_2 operator. He (she) should not receive notifications.
4. Create the Alert\_3 alert. The severity level is 019. Define message text.
5. Create the Alert\_4 alert. The error number is 9005. Define message text.
6. Associate the Alert\_3 alert to the Job\_3 job. First create the Job\_3 job and associate it to server.
7. Change the error number of the Alert\_4 alert. The new value is 9010.
8. Change the severity level of the Alert\_4 alert. The new value is 022.
9. Change the time delay between the occurrence of an event and the activation of a notification of the Alert\_3 alert. The new value is 3 minutes.
10. Change the Alert\_3 alert so, that an error text will be included into message sent by network.
11. Delete the Alert\_4 alert.