

Fusion Database - Back-up and Size Monitoring

Application Note

Applicable Versions Of The Fusion System

Version	Date
5.0.2.1 and subsequent versions	30/10/2018

Introduction

In the case of large Fusion systems the Fusion database tends to be located on a dedicated database server that is backed-up daily by the customer's IT department. On smaller Fusion systems the database is usually located on the Fusion server PC and runs under SQL Server Express (with a maximum allowed data file size of 10GB). Any backing-up of these Fusion databases has to be via a manual procedure that involves use of the SQL Server Management Console. Many customers fail to put in place procedures to carry out the manual back-up on a regular basis with the result that in the event of a disc failure or database corruption (which can occur if the database increases in size to the 10GB data file size limit) there is no recent database back-up that can be used after the hardware has been repaired.

In Fusion v5.0.2.1 a new feature has been added which allows the user to configure an automatic database back-up. This back-up is carried out by the Fusion Server program. In addition several other database-related features have been added to Fusion as follows:

- 1) Fusion Server Database Size Monitoring: The Fusion Server program monitors the Fusion database size and, in the case of a database that has a maximum allowed size (such as an SQL Server Express database that has a 10GB data file size limit) will shut itself down just before the file limit is reached.
- 2) Fusion Client Database Information Panel: The Fusion Client program displays database related information at the bottom of the main screen when it runs up. After a few seconds this information disappears unless the database has almost reached its maximum allowed data file size in which case a warning message is displayed in red and the database information remains on the screen.
- 3) Event Graphs: Three new graphs have been added to the Data Graphs tab. These graphs show the number of records per hour that have been written to the Remote Events, System Events and MSB/ELM Status Data tables during the past week. Events that are occurring in unusually large numbers can cause these tables to grow rapidly in size, which can in turn cause the whole database to grow rapidly in size.



Automatic Database Back-up

The Fusion automatic database back-up function is configured on the General Configuration tab of the Fusion System Configuration record (System /System Configuration / System Settings).

The screenshot shows the Fusion System Configuration interface. The 'Database Back-up' section is highlighted with a red circle. The settings for this section are:

- Automatic Back-up Enabled:
- Back-up Start Time: 02:10
- Retry Delay (mins): 2
- Max. Retries: 3
- Back-up Frequency (days): 2
- Keep Back-up for (days): 6
- Back-up Path: C:\Program Files\Microsoft SQL Server\MSSQL12.SQLEXPRESS\FUSION\

The Database Back-up settings that can be configured are:

Automatic Back-up Enabled: A tick in this checkbox enables the automatic back-up function.

Back-up Start Time: The time of day at which the back-up should occur. (The back-up may actually start shortly after this time, depending on the timing of the relevant processes in the software).

Retry Delay (mins): The delay that the software will implement between retries in the event of a failed back-up.

Max. Retries: The maximum number of times that the software will retry a back-up that failed.

Back-up Frequency (days): The number of 24 hour periods that should occur between back-ups. Set this field to 1 for a daily back-up. Set to 7 for a weekly back-up.

Keep Back-up for (days): The number days that the back-up should be kept before the software deletes it.

Back-up Path: The path to the folder in which the back-up is to be created. Note that this path can include local drives and mapped drives but not network addresses/names.



If the Automatic Back-up Enabled checkbox is ticked the Fusion Server program attempts to back-up the Fusion database to the specified folder soon after the specified time of day. (The back-up function runs within one of the timer threads within the Fusion Server program which runs every few minutes so the back-up may actually occur several minutes after the scheduled time).

The back-up file is given a name in the following format: 'FusionCore_1_20181131_023000.bak' where:

- 'FusionCore' is the name of the database
- '1' is a fixed number
- '20181131' is the date (31/11/2018) of the back-up
- '023000' is the time (02:30:00) of the back-up

When the back-up completes the software checks that the expected back-up file exists and notes its size. If the file exists a suitable record is created in the System Events log:

FUSION - System Events Report

www.borer.co.uk
 .\SQLEXPRESS\FUSION \ FusionCore (v50) \ borer

Event Local Time	Event Number	Operator	Terminal	Event Kind	Details
30/10/18 00:00:01	3517075	[SYSTEM]	{0}	Book Attendance Calc	Auto - 5 People
30/10/18 00:00:01	3517076	[SYSTEM]	{0}	Book Attendance Calc	Auto - 10/29/2018-10/29/2018 5 Chapman, Bob
30/10/18 00:00:01	3517077	[SYSTEM]	{0}	Book Attendance Calc	Auto - 10/29/2018-10/29/2018 9 Heyburn, Kevin
30/10/18 00:00:01	3517078	[SYSTEM]	{0}	Book Attendance Calc	Auto - 10/29/2018-10/29/2018 12 Henry, Sharon
30/10/18 00:00:01	3517079	[SYSTEM]	{0}	Book Attendance Calc	Auto - 10/29/2018-10/29/2018 99 Chapman, Trisha
30/10/18 00:00:01	3517080	[SYSTEM]	{0}	Book Attendance Calc	Auto - 10/29/2018-10/29/2018 110 Carvalho, Luis
30/10/18 00:00:01	3517081	[SYSTEM]	{0}	Book Attendance Calc	Auto - Complete
30/10/18 00:00:16	3517082	[SYSTEM]	{0}	Database Size	Size=1134MB Max=10240MB (11.06%)
30/10/18 02:10:17	3517083	[SYSTEM]	{0}	Database Back-up	Back-up starting
30/10/18 02:16:20	3517084	[SYSTEM]	{0}	Database Back-up	Back-up completed - FusionCore_1_20181030_021017.bak (1062MB)
30/10/18 10:20:41	3517085	BORER Master Account INHOUSE		Form Show	(Access Made)
30/10/18 10:20:41	3517086	BORER Master Account INHOUSE		Operator Sign On	Record 1, (Login borer)
30/10/18 10:20:42	3517087	BORER Master Account INHOUSE		Form Show	(System Events View)
30/10/18 10:20:44	3517088	BORER Master Account INHOUSE		Form Show	(Reports View)

If the back-up fails an appropriate error message is written to the System Events log. The back-up will then be re-tried as per the 'Retry Delay' and 'Max. Retries' settings.

Once a back-up has succeeded (or failed and run out of re-tries) the software will not attempt another back-up until at least the following day.

Once a back-up has been successful the 'Back-up Frequency' setting will determine when the next back-up is attempted. A setting of 1 day will cause daily back-ups. A setting of 2 days will cause a back-up to occur every other day.

The software will delete any back-ups in the specified folder that are older than the 'Keep Back-up for' setting and have a name that starts with 'FusionCore_1_' (if FusionCore is the name of the Fusion database). However if only one back-up is left the software will not delete this.



Fusion Server Database Size Monitoring

The Fusion Server monitors the size of the Fusion database data file and writes size information to the System Events log at the start of each day:

FUSION - System Events Report

www.borer.co.uk

.\SQLEXPRESS\FUSION \ FusionCore (v50) \ borer

Event Local Time	Event Number	Operator	Terminal	Event Kind	Details
30/10/18 00:00:01	3517075	[SYSTEM]	{0}	Book Attendance Calc	Auto - 5 People
30/10/18 00:00:01	3517076	[SYSTEM]	{0}	Book Attendance Calc	Auto - 10/29/2018-10/29/2018 5 Chapman, Bob
30/10/18 00:00:01	3517077	[SYSTEM]	{0}	Book Attendance Calc	Auto - 10/29/2018-10/29/2018 9 Heyburn, Kevin
30/10/18 00:00:01	3517078	[SYSTEM]	{0}	Book Attendance Calc	Auto - 10/29/2018-10/29/2018 12 Henry, Sharon
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30/10/18 00:00:01	3517080	[SYSTEM]	{0}	Book Attendance Calc	Auto - 10/29/2018-10/29/2018 110 Carvalho, Luis
30/10/18 00:00:01	3517081	[SYSTEM]	{0}	Book Attendance Calc	Auto - Complete
30/10/18 00:00:16	3517082	[SYSTEM]	{0}	Database Size	Size=1134MB Max=10240MB (11.06%)
30/10/18 02:10:17	3517083	[SYSTEM]	{0}	Database Back-up	Back-up starting
30/10/18 02:16:20	3517084	[SYSTEM]	{0}	Database Back-up	Back-up completed - FusionCore_1_20181030_021017.bak (1062MB)
30/10/18 10:20:41	3517085	BORER Master Account INHOUSE		Form Show	(Access Made)
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30/10/18 10:20:44	3517088	BORER Master Account INHOUSE		Form Show	(Reports View)

If the database has a maximum allowed data file size and the file reaches 99.95% of this size the Fusion Server program will shut itself down. FireDaemon will attempt to re-start the Server program but the program will only run up if the database data file is less than 99.95% of the maximum allowed size. If necessary this behaviour can be disabled by using the command line parameter '/DBMAXSTOPOFF'.



Fusion Client Database Information Panel

The Fusion Client program displays a database information panel at the bottom of the main display on start-up. The panel shows the size of the Fusion database data file and displays information relating to the version of SQL Server that is in use. (Note that this panel is not displayed if the registration/licencing panel is displaying an alert).

The screenshot shows the Fusion Client interface with the following details:

- Window Title: FUSION - Borer Data Systems - Version: 5.0.2.1
- Navigation: Log In, Status, Help, Licence, Roll Call Disp., Floor Plan
- Path: .\SQLEXPRESS\FUSION\FusionCore[Special Edition]
- Logo: Fusion smart solutions @ work
- Section: General Status
- System Events: System Alarms, NIMs - Building Controllers, System Devices & Readers
- Table Headers: Date Time, Device Name, Person Name, Message, L D Person/Card, Description
- Message: Change Terminal record to monitor traffic at this location whilst not logged in to Fusion. This terminal is INHOUSE
- Progress Bar: Fusion DB Data File Size (Max) 10240MB, Current Size 1134MB
- System Info:
 - SQL Server: 2014 Express Edition (64-bit) 12.0.5000.0 SP2
 - Fusion Data File: File size = 1134MB - Free space = 72MB
 - Fusion Log File: File size = 1MB - Free space = 488KB

The panel is displayed for 10 seconds if the database size is below 50% of the maximum allowed, 20 seconds if below 75% and 30 seconds if below 85%. If the database reaches 85% of the maximum allowed size the panel displays a warning message for 45 seconds.

The screenshot shows the Fusion Client interface with the following details:

- Progress Bar: Fusion DB Data File Size (Max) 10240MB, Current Size 8909MB
- System Info:
 - SQL Server: 2014 Express Edition (64-bit) 12.0.5000.0 SP2
 - Fusion Data File: File size = 8909MB - Free space = 72MB
 - Fusion Log File: File size = 1MB - Free space = 488KB
- Warning Message: **Fusion database size is 87.00% of maximum allowed - database size should be reviewed**

If the database reaches 95% of the maximum allowed size the panel displays a red warning message for 90 seconds.

The screenshot shows the Fusion Client interface with the following details:

- Progress Bar: Fusion DB Data File Size (Max) 10240MB, Current Size 9830MB
- System Info:
 - SQL Server: 2014 Express Edition (64-bit) 12.0.5000.0 SP2
 - Fusion Data File: File size = 9830MB - Free space = 72MB
 - Fusion Log File: File size = 1MB - Free space = 480KB
- Warning Message: **Fusion database size is 96.00% of maximum allowed - database size should be reduced**

If the database reaches 98% of the maximum allowed size the panel displaying the red warning message at Client start-up remains on view permanently, and if the database reaches 99% the message becomes more urgent.

The screenshot shows the Fusion Client interface with the following details:

- Progress Bar: Fusion DB Data File Size (Max) 10240MB, Current Size 10138MB
- System Info:
 - SQL Server: 2014 Express Edition (64-bit) 12.0.5000.0 SP2
 - Fusion Data File: File size = 10138MB - Free space = 72MB
 - Fusion Log File: File size = 1MB - Free space = 512KB
- Warning Message: **Fusion database size is 99.00% of maximum allowed - LOSS OF SYSTEM FUNCTIONALITY IMMINENT**

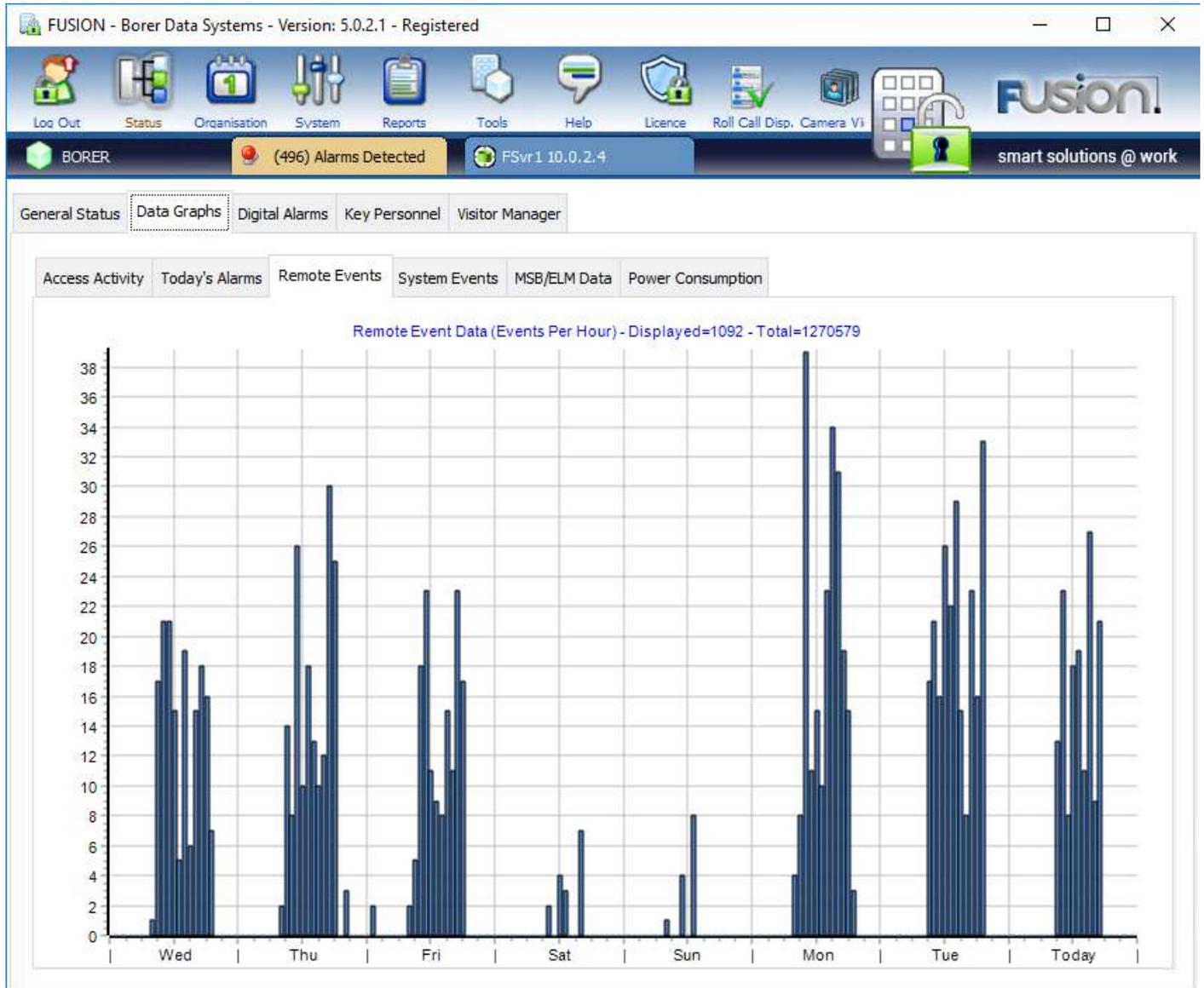
Note that when the message is on permanent display it is not updated in real time – only when the user re-starts the Client program.



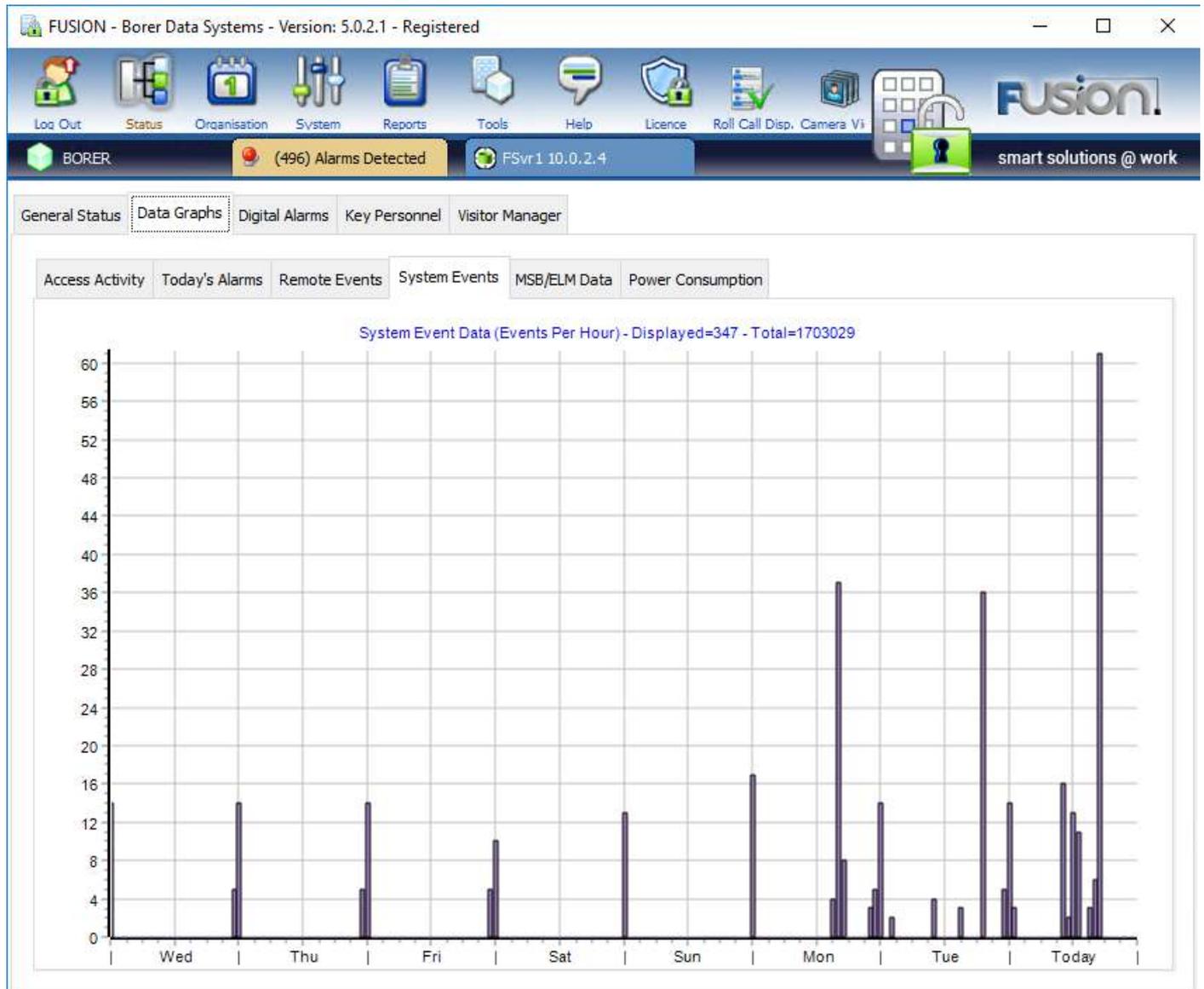
Event Graphs

Three new graphs have been added to the Data Graphs tab of the Fusion Status window. These graphs show the number of records per hour that have been written to the Remote Events, System Events and MSB Power Data tables during the past week. The principle aim of these graphs is help to identify which log table is having a large number of records written to it in the case of a database that is rapidly increasing in size.

Remote Events



System Events



MSB/ELM Data

