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## SQL Express Limitations

This document focuses on SQL Express, as SQL Express has limitations that the other versions of SQL do not have. Below are the limitations for the various versions of SQL Express.

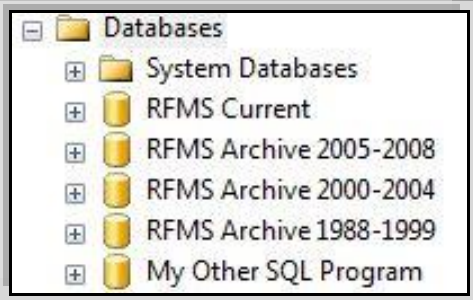
| | **SQL Express 2005** | **SQL Express 2008** | **SQL Express 2008r2** |
|---|---|---|---|
| Max DB Size | 4 GB Database | 4 GB Database | 10 GB Database |
| Max RAM Usage | 1 GB of RAM | 1 GB of RAM | 1 GB of RAM |
| Physical CPU Usage | 1 CPU | 1 CPU | 1 CPU |

RFMS has always put limitations on SQL Express to prevent issues with performance. As the chart shows, SQL supports databases up to 10 GB in size for SQL 2008 Express **R2**, however we have placed a limit of 1 GB in size due to the Maximum RAM that can be utilized. Performance issues arise when the database exceeds 1 GB, primarily due to the fact that anything over this size is read from Hard Drive Page File vs. the RAM Memory Cache. For further explanation, please read the bolded section below.

****Important Information about Memory and SQL****

The amount of memory required for Microsoft SQL is determined by the size of the database. SQL will typically take up anywhere from a 0.5:1 – 1:1 ratio of RAM to Database Size. For example, if you have a 1 GB Database, the memory taken up would be around 500 MB - 1024MB. ←1024MB is the maximum amount of memory that SQL Express can allocate to the caching of the database, and therefore is why we make our maximum database size recommendation of 1GB.

Furthermore, the memory utilization specifics as mentioned above are not limited to each database. Rather, EACH database that is attached to your SQL Server contributes to the amount of memory required to support SQL. This is true, even if you are not actively accessing certain databases that are attached. For example, let's say that your server looks like the screen shot below: (topic continues on next page)




In this example, you have your current RFMS database, 3 RFMS archives, and database from another program that uses SQL. For the sake of our example, let's say that each of the databases is 900MB. This means that you have a total of 4.5GB in databases running on your server. This means that SQL would need 2.25GB – 4.5GB of memory to support the databases, but SQL express will only allocate 1GB, and therefore you will suffer performance problems and potentially lockups.

***Note: At the point that a SQL database reaches the 1GB Maximum Size Recommendation, the database can run increasingly slower and cause intermittent lockups. If the database reaches the Absolute Maximum Database Size, it will begin to return errors, lock users out, and even prevent you from adding or modifying orders and other information.***

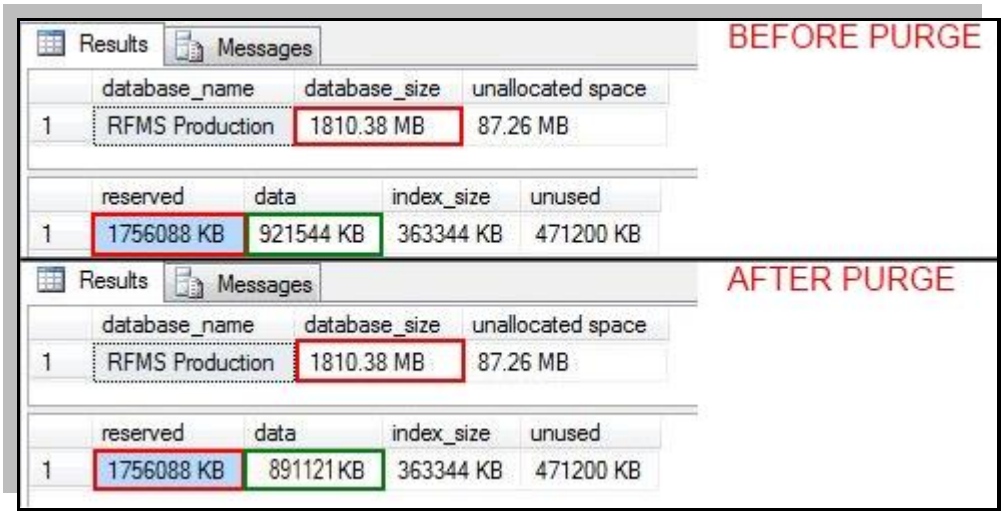
It is because of this, that we strongly recommend checking the Size Periodically. (See the appropriate section below for instructions.)

## Database Growth

Since SQL Express has limits on the maximum size that a Database can grow, it is imperative to monitor this. When a database approaches or exceeds the maximum size, the database will return errors, lock users out and stop your workflow by prohibiting the addition of new information or modification of existing information.

Please note that purging your RFMS data **WILL NOT** shrink your database. RFMS has processes for purging within, however with the SQL version of RFMS (v10+) the process of Archiving and Purging is not needed like it was with previous versions of RFMS using the Pervasive Database Engine. In fact, if using SQL Express one should be very cautious with this process as each archive database will increase the amount of memory required to support the database. As we already discussed, the maximum memory allocation in SQL Express is only 1GB, and therefore, if the total database size between the archives and live data exceeds 1GB you may, and more than likely ***will*** experience performance problems. (topic continues on next page)

In this screen-shot from SQL, we can see the results from before and after a purge in RFMS.




Here we can see three important fields:

1. Database Size
2. Reserved Size
3. Data Size

The database size is the total size of the database. This is the number that 'counts' with regard to the memory usage. The reserved size is the amount of data that SQL reserves for the database. The data size is the space consumed by the actual data. As you can see, after an RFMS purge this number decreased. However, the database size and reserved size stayed the same. Therefore, the amount of memory necessary to efficiently run the database is the same before and after the purge. For this reason, purging does not offer performance benefits in SQL RFMS, and can actually cause performance problems when coupled with an archive database, especially when running a server with SQL Express or inadequate memory.

We recommend consulting with your IT Professional / SQL DBA for SQL database maintenance and proper procedures, especially when re-indexing as this tends to increase the size of the database.

## Verify Size of Database

The database consists of two files ( MDF and LDF ). These can be checked by doing the following:

1. Open SQL Management Studio
2. In the object explorer on the left hand side, expand the "Databases" tab, right click on the Database and go to properties
3. Select "Files"

The Column "Initial Size (MB)" contains the information needed.

***Note: If the Primary File ( First File in list ) is close to the Maximum Database Size Limit or exceeding this limit, please consult with your IT Professional about the appropriate measures.***

***Note: If the Log Files ( Second File in list ) is large, this indicates that backups are not being executed on the Transaction Log File. If this is the case, RFMS Recommends consulting with your IT Professional to resolve and if necessary, get a backup solution in place. Our documentation for automatic backups of the database and transaction log file can be found on our website after logging in and going to the "Technical Support" section. The document is called SQLBackupProcess.pdf.***

## Backups

With previous versions of RFMS (Version 9 and prior) the data and program files were stored within the RFMS Folder. Starting with Version 10 of RFMS, only the PROGRAM files are stored in the RFMS folder. The database which contains all of your data such as customers, orders, etc, is stored in the Microsoft SQL predefined location. Additionally, SQL locks the database so that a simple copy of the .mdf and .ldf will not work and therefore requires a Backup Procedure such as a Maintenance Plan / Backup Program with SQL Agent in order to get a backup of the SQL Database.

RFMS recommends backing up both the Program Files, as well as the Database. We recommend multiple backup sets, rather than overwriting. RFMS also recommends backups to external media (tapes, external drives, offsite location, etc…)

Additionally, RFMS recommends testing backups periodically to ensure stability of the Backup Solution. As part of this process, we recommend running a DB Integrity Check. SQL Express doesn't have maintenance plans built into the management tools to run these checks automatically like the paid versions do. Because of this, your IT Professional will need to run manual commands. Commands such as "DBCC CheckDB" will assist with this.

***Note: If your database is set to a full recovery model, it is imperative to make sure that your Backup Solution is performing both a Full Backup and the Transaction Backup. Failure to back up the full database will result in RFMS data not being backed up. Failure to back up the transaction log will result in the SQL Log file building in size daily until the hard drive runs out of space.***

For more information about backups, please see our specific documentation. Our documentation for automatic backups of the database and transaction log file can be found on our website after logging in and going to the "Technical Support" section. The document is called SQLBackupProcess.pdf.