ONE LAMBDA
Advancing Transplant Diagnostics

User Manual
Database Utility

HLA Fusion *Research* Software Version 3.0

All of One Lambda software products are designed to assist personnel experienced in HLA analysis by suggesting typing results. However, any clinical or diagnostic results must be carefully reviewed by a person qualified in HLA typing to assure correctness. This software may be used to aid in suggesting results, but should not be used as the sole method for determining reportable results. This software is meant as a laboratory aid, not as a source of definitive results. The software design does not mitigate hazards associated with the software. The laboratory director or technologist trained in histocompatibility testing is required to review all data to detect any problems with the software. Please note that this document was prepared in advance of the HLA Fusion Research software release. Therefore, you may notice slight differences in the content of the actual application screens.

For Research Use Only. Not for use in diagnostic procedures.

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HLA Fusion™ Database Utility

With the HLA Fusion™ Research Database Utility, you can access and select a SQL Server database from any location within your system network connected to your computer, provided the database configuration has been set up for remote access.

The HLA Fusion Research Database Utility allows you to create and connect to SQL Server databases, as well as perform all of the following tasks.

- Create a new database
- Select/connect to an existing database
- Make a backup copy of your database or create a schedule for regular backups
- Restore a database
- Detach from and delete a database
- Attach to a database
- Create or connect to an audit log to record user activity in HLA Fusion Research
- Merge databases
- Optimize databases
- Reconfigure databases
- Upgrade an HLA Fusion Research database to the current version.
- Review the details of your Fusion databases.

Caution: Please back up your database before performing any database utility function.

Opening the HLA Fusion Database Utility

The HLA Fusion Research Database Utility allows you to connect to any SQL Server on your computer or the network, depending on your permissions and your organization's security policies.

To use any of the Fusion Database Utilities, you must first connect to a SQL Server. With the exception of connecting to a database, the database tasks can be executed only on the server or on the computer on which the database resides.

The following are guidelines for using the Fusion Database Utility:

- You can connect to the SQL Server using either Windows Authentication or SQL Server Authentication. If you use SQL Server Authentication, the Server **Dialog Box** displays the default database administrator user name and password for a local client/server installation.
- It is highly recommended that you do not switch collation and regional settings between databases. The collation of databases and the SQL Server play a major role during database merge and migration. (A *collation* encodes the rules governing the use of characters and numbers for a language or an alphabet.)
- Please do not alter the **permissions**, (i.e., who has the right to make certain changes to the database).

1. Double-click the **Database Utility** icon on your computer desktop.

   The **Connect to SQL Server** dialog box is displayed.

2. Make sure your SQL Server information is correct and click the **OK** button.

The Database Utility **Main Window** is displayed.

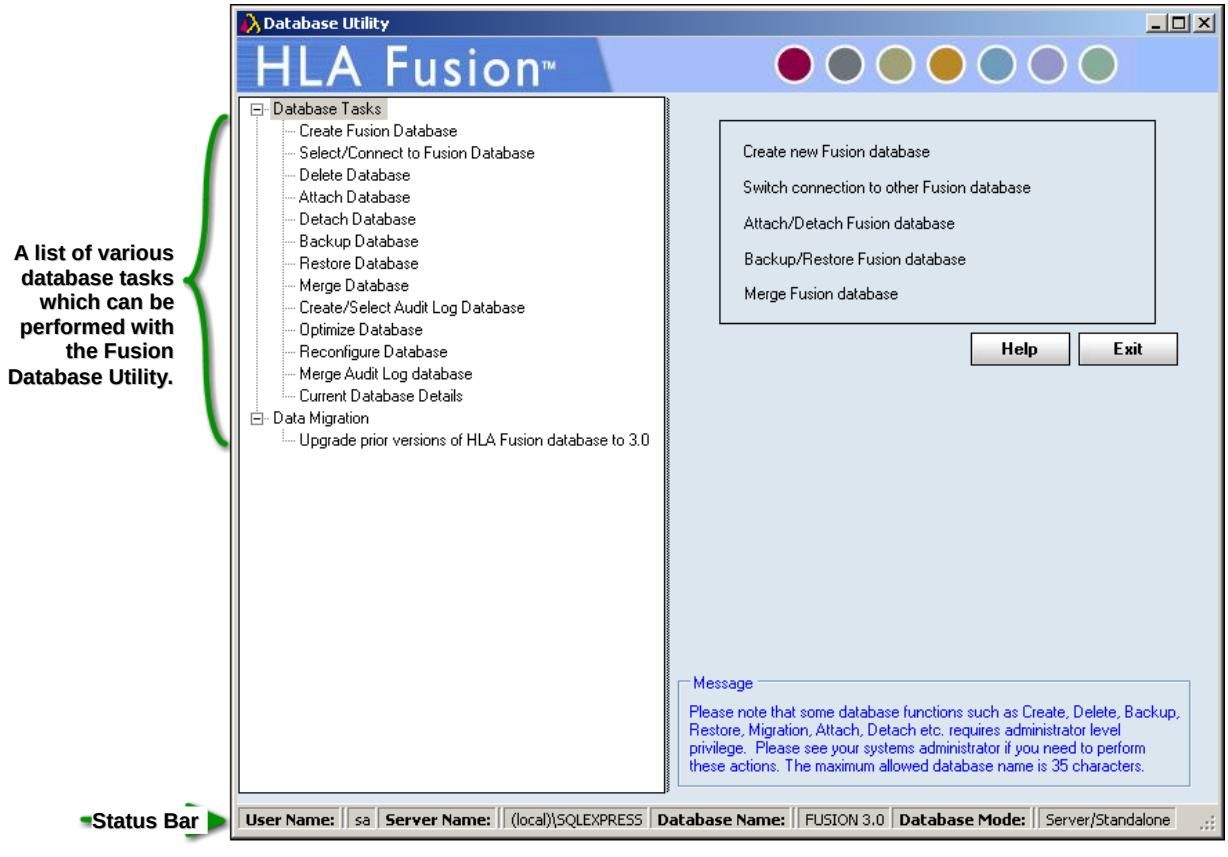


Figure 1: HLA Fusion Database Utility Main Window

The status bar at the bottom of the Fusion Database Utility main window displays the Active User, Server Name, Database Name, and the Database Mode, (i.e., Fusion and the database are on the same computer, or the database resides on an external server).

- The **User Name** field will say *Not Set* if you are using Windows Authentication.
- A **Help** button is available on every Database Utility window, or press the **F1** key.
- Click the **+/-** signs on the far left to display or hide related database utility menu options.

Database Tasks

The **Database Tasks** listed on the left side of the Main Window offer various means to configure, manage and maintain a Fusion database. These functions are described in the following sections.

Creating a New Database

Note: A new database can be created only on the computer or server on which the SQL Server program resides.

1. On the left side of the **Database Utility** window, click **Create Fusion Database**.

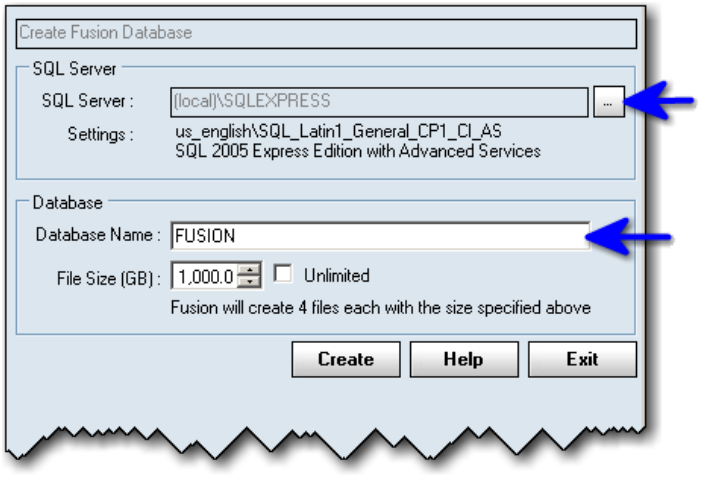


Figure 2: Create Fusion Database Screen

2. Make sure the **SQL Server** is the correct one for the database you want to create.
3. Enter a unique **Name** for the new database.
4. Choose the maximum database size, and click **Create**.

Note: With SQL 2005 Express and SQL 2008 Express, placing a check mark in the box next to **Unlimited** will create a database in the maximum allowable size of four gigabytes.

For a purchased, full-version of SQL Server, the maximum database size is one terabyte. Ensure that you have adequate storage space for a database of this size.

Please ensure that you maintain consistent collations of your Fusion SQL Server database. Different collations use different comparison rules for data handling which can cause a conflict during database merges.

Provided the newly created database name does not already exist, the system creates the new database and displays the following message.

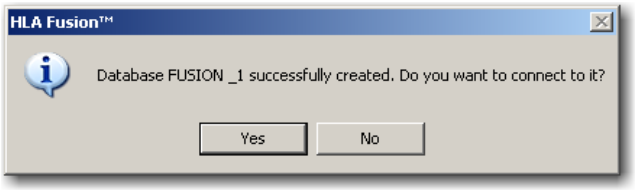


Figure 3: Database Created Confirmation

5. Click **Yes** to connect to it. Click **No** if you do not wish to connect to it at this time.

   If you click **Yes**, a connection confirmation message is displayed.

6. Click the **OK** button.

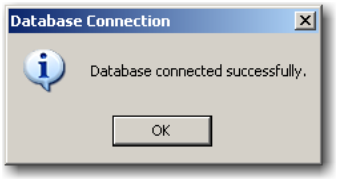


Figure 4: Successful Connection

If the newly created database **name** already exists, the Database Utility displays the following error message.

7. Click the **OK** button. Then verify that the database name you entered is unique to the selected SQL Server, and retry.

Figure 5: Database Creation error

Note: The Fusion Database Utility creates a User ID named **FUSION_USER** within the database at the time of creation. Please do not alter the status of this user.

The maximum length of a database name must not exceed 35 characters.

Selecting and Connecting to a Database

From the Database Utility Window, you can choose to connect to a database that already exists on the selected server. The subsequent analysis with HLA Fusion will use the selected database.

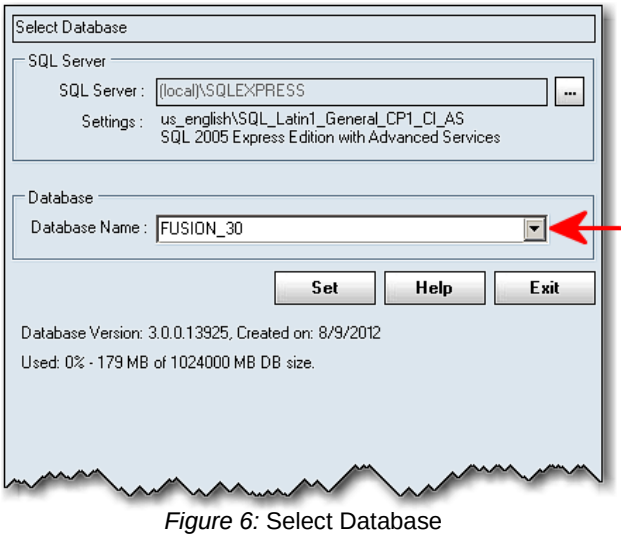


Figure 6: Select Database

1. In the **Database Utility** window, click the **Select/Connect to Fusion Database** option.

2. From the **Database Name** drop-down list, select a database. The database version, creation date, percentage used, as well as current and maximum sizes of the selected database are displayed below.

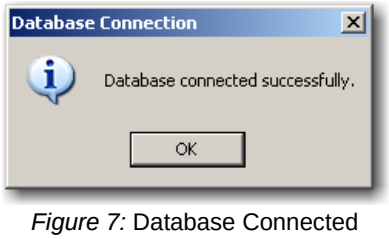


Figure 7: Database Connected

3. Click the **Set** button. The following message is displayed.

4. Click the **OK** button. The database you selected is now listed in the Database Name field in the **Status Bar** at the bottom of the Database Utility window.

Figure 8: Utility Status Bar

Deleting a Database

From the Database Utility window, you can delete an existing database from the server.

1. Within the **Database Utility** window, click **Delete Database**.

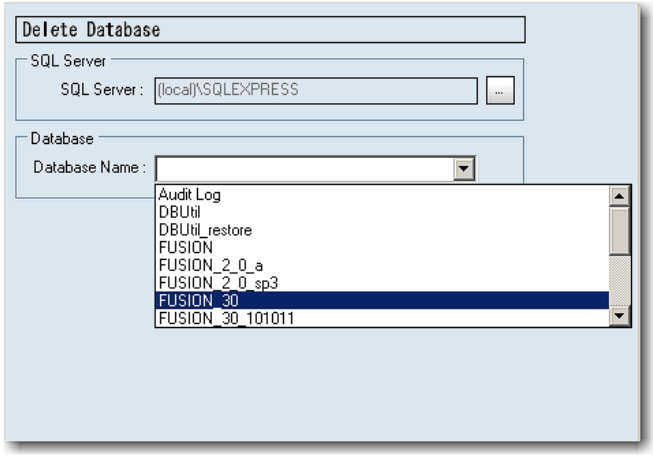


Figure 9: Select Database to Delete

2. From the **Database Name** drop-down list, select a database and click the **Delete** button. The following prompt is displayed.

Note: If you receive a message that the selected database is busy, please try this action again in a few minutes. You cannot delete an attached database.

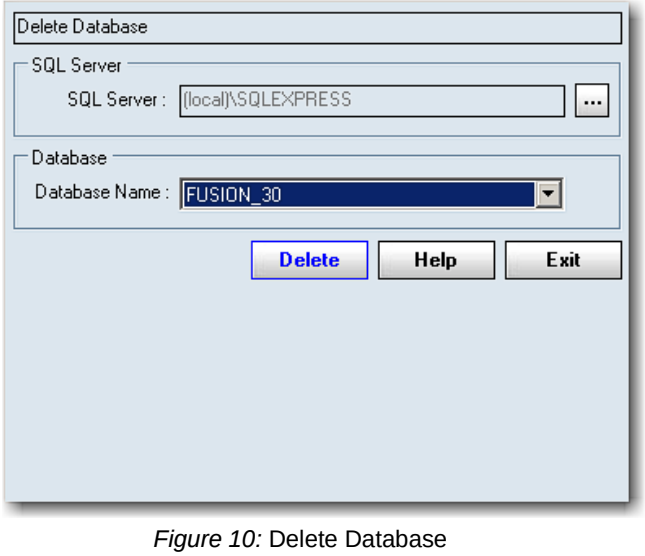


Figure 10: Delete Database

3. Click the **Delete** button.

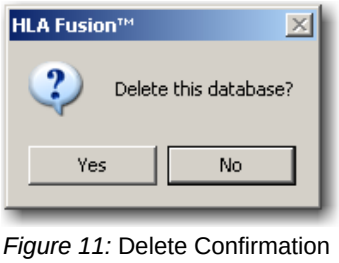


Figure 11: Delete Confirmation

4. The following confirmation message is displayed. Click the **Yes** button to continue with the database deletion.

The Database Utility confirms the deletion.

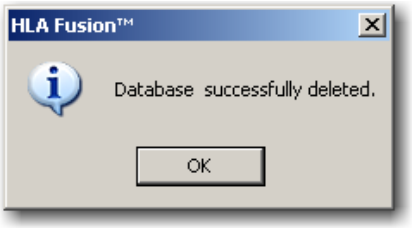


Figure 12: Database Deleted

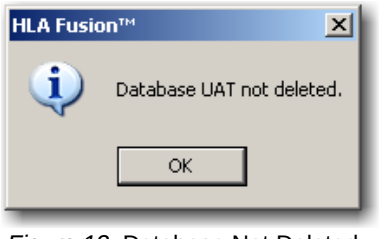


Figure 13: Database Not Deleted

5. If you click **No**, a message verifying that the database was <u>not</u> deleted is displayed. Click the **OK** button to exit.

Attaching to a Database

You may use the **Attach** and **Detach** Database options together when you want to move a database to another location and then link to that new location. Here is the sequence to follow if you want to do this:

- Detach the database, (see: *Detaching a Database*, for more information)
- Move the database **.mdf** file, (which contains the database) to the desired location on another server.
- Attach the database, using the steps below to specify the new location of the moved database.

You can use Attach database to link to any Fusion database .mdf file. However, the database .mdf file you are attaching must reside on the selected server.

Note: It is recommended that you back up the database before using the **Attach** feature.

1. Within the **Database Utility** window, click **Attach Database**.

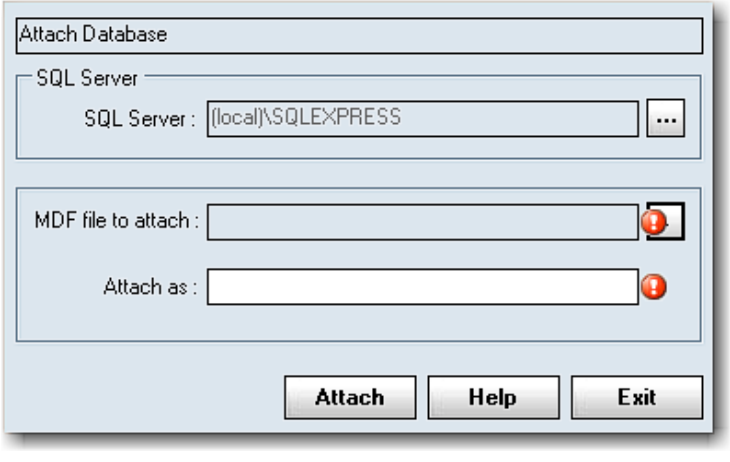


Figure 14: Attach a Database

2. Click the **Browse** button ... next to the **MDF file to attach** field, and locate the database file you want to attach to Fusion.

3. Select the database (*.mdf) file, and click the **Open** button. The selected (*.mdf) file displays in the **MDF file to attach** field.

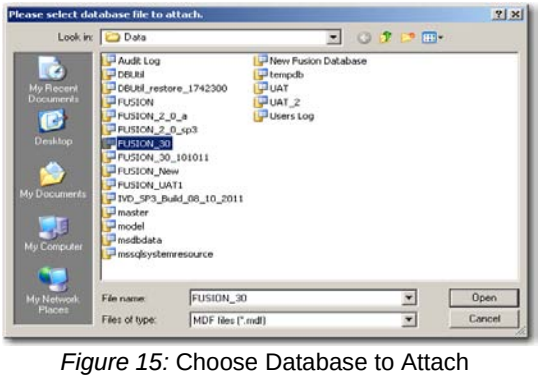


Figure 15: Choose Database to Attach

Enter a name for the database in the **Attach as** field.

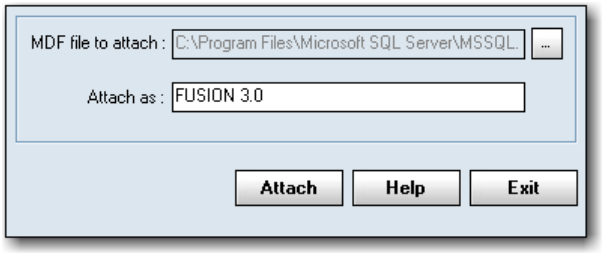


Figure 16: Attach to the Database

4. Click the **Attach** button.

Detaching from a Database

If you wish to move a database file, (.mdf) to another location for disk space considerations or other reasons, you must first detach it from Fusion. Then, you can relocate it and link to its new location, (*see:* Attaching to a Database).

Or, you may no longer want to have HLA Fusion Research Software linked to a particular database, but you do not want to delete it yet.

Note: You cannot detach a database which is currently in use.

1. Within the **Database Utility** window, click **Detach Database**.

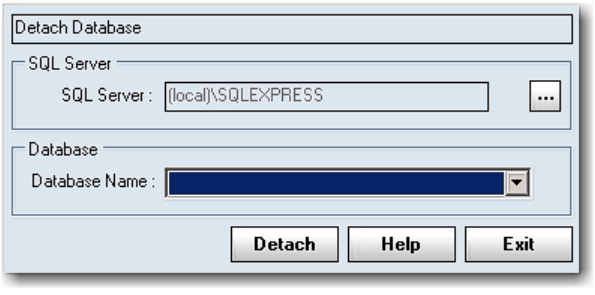


Figure 17: Detach a Database

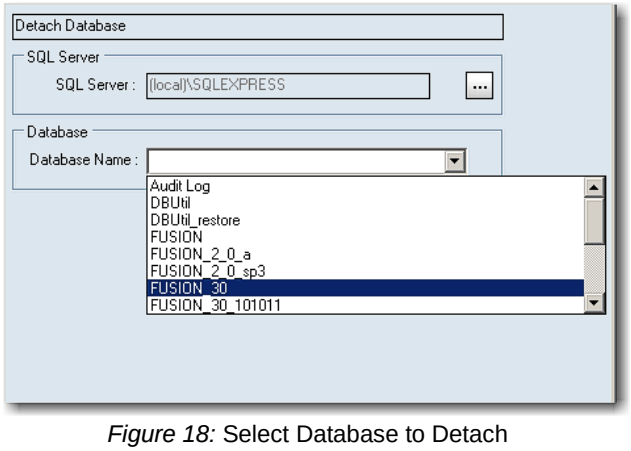


Figure 18: Select Database to Detach

2. From the **Database Name** drop-down list, select a database and click the **Detach** button. The following message is displayed.

3. Click the **OK** button.

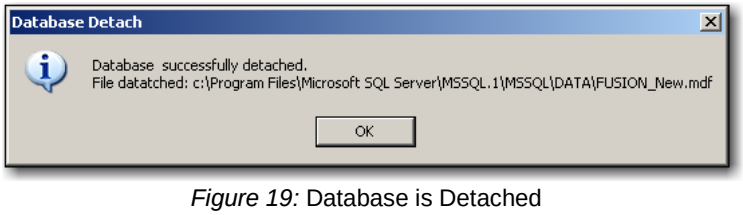


Figure 19: Database is Detached

Note: A detached database .mdf file is located in the directory where the Fusion instance of SQL was installed (e.g., the default is **C:\Program Files\Microsoft SQL Server\MSSQL1\MSSQL\Data)**.

Creating a Database Backup File

It is recommended that you create regular, frequent backups of your HLA Fusion database(s). If some event occurs that corrupts a database, or makes it inaccessible, having a backup copy of the database allows you to restore all data up through the date of the most recent backup. Use the Schedule Backup feature to set up automated regular backups of a specified database—any day or time, and as often as desired. For information on restoring a database with a backup copy, see

The backed up database must be saved to the local drive of the server or the computer on which you are creating the backup copy. The filename of the backup file is the name of the database with a .bak extension.

Note: You can use a shared or network mapped drive to store backups if the SQL agent is given the appropriate permissions to that directory. For more information, please refer to **http://support.microsoft.com**.

1. Within the **Database Utility** window, click **Backup Database**.

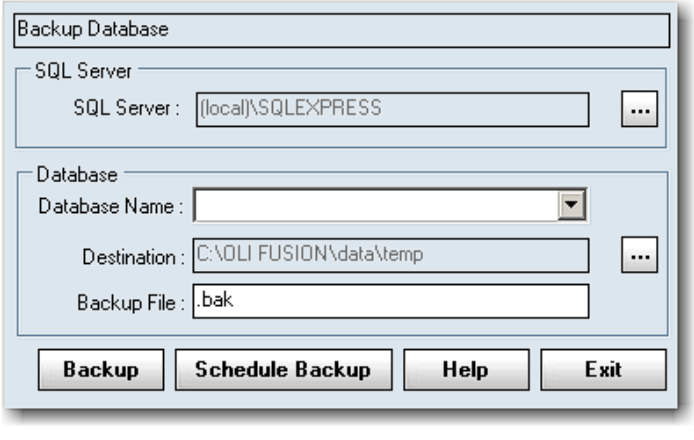


Figure 20: Backup a Database

2. From the **Database Name** drop-down list, select a database.
3. Click the **Browse** button ... next to the **Destination** field.

Note: Make sure you select a destination directory that is on the selected SQL Server. Do not choose your desktop as the location for backups. It is recommended that you create a special folder for these on the C: drive (e.g., **C:\DB Backups**).

This brings up a new window where you can browse to select a destination folder for the database backup.

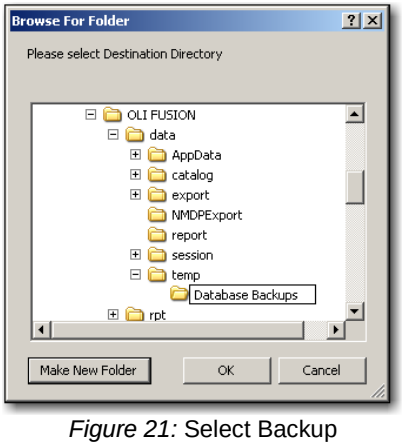


Figure 21: Select Backup

4. Indicate a database backup file name in the **Backup File** field (by default, it is the database name). You may also click the **Make New Folder** button and create a special folder for your database backups. The backed up files are stored with a (.bak) file extension.
5. Do one of the following to either back up the database immediately, or schedule for another day(s) and time:
   - To perform a backup of the database immediately, click the **Backup** button.

     The following message confirms a successful database backup.

Click the **OK** button to exit.

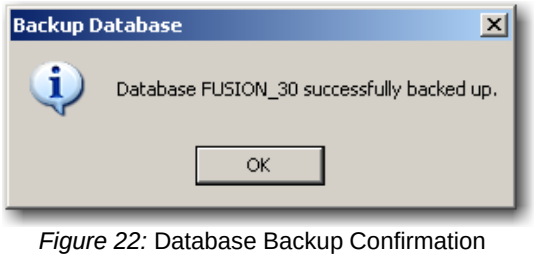


Figure 22: Database Backup Confirmation

Note: The length of time required to back up a database is proportional to its size—the larger the database, the longer it takes to back it up.

- To schedule backup(s) for a future date and time, or on an automated schedule, click **Schedule Backup**. The backup scheduler is displayed.

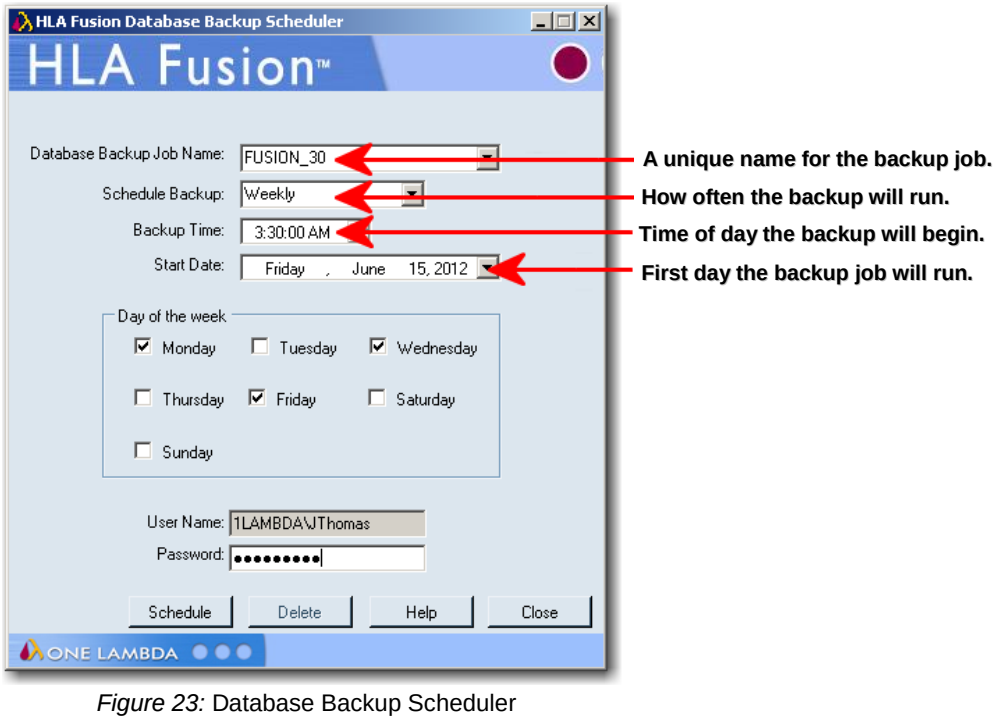


Figure 23: Database Backup Scheduler

- Complete the fields in the Database Scheduler to set the backup day and time:
  - **Database Backup Job Name:** Enter a unique name for the backup. Each scheduled backup task requires a unique name.
  - **Schedule Backup:** Use the drop-down arrow to select the backup frequency (Daily, Weekly or Monthly).
  - **Backup Time:** Use the up/down arrows to set the time at which to start the scheduled backup. Please note that the length of time required to back up a database is proportional to its size - the larger the database, the longer it takes to back it up.
  - **Start Date:** Click the drop-down arrow and select the date on which you want the scheduled backup process to begin.
  - **Days of the week:** If you selected a frequency of weekly or monthly, select the check box for the day(s) of the week for which you would like to schedule backups. This option is grayed-out if the specified frequency is Daily.
- Enter your Windows password in the **Password** field. You must enter your Windows password to ensure you have the correct privileges to back up the database as specified.
- Click the **Schedule** button.

Note: You are not required to have HLA Fusion Research running or be logged in to run the scheduled backup task. However, you must have your computer on during the backup period.

If your scheduling is confirmed, the following message is displayed and you should click **OK**.

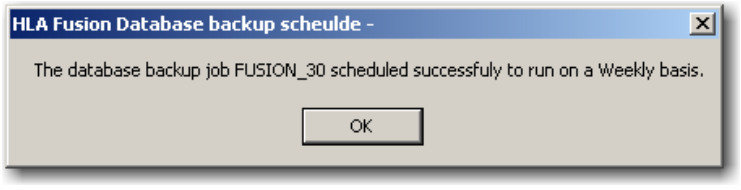


Figure 24: Scheduled Backup Confirmation

Note: The directory you specified for the scheduled backups will contain the database backup file, (.mdf) as well as a log file that documents the backup job status.

Deleting a Scheduled Backup

Take the following steps to delete a scheduled backup job.

1. Click **Schedule Backup**. The backup scheduler is displayed.

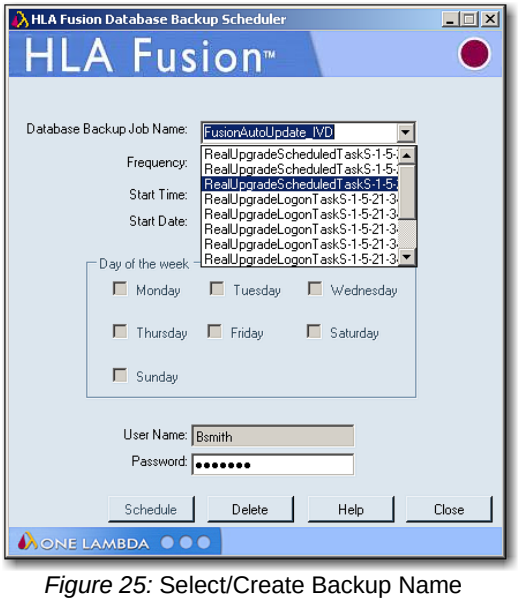


Figure 25: Select/Create Backup Name

2. Use the drop-down arrow in the **Database Backup Job Name** field to select a scheduled backup task to delete.

Note: The drop-down list for backup jobs may display more tasks than Fusion tasks, so be careful to select only the Fusion database backup task you wish to delete.

3. Click the **Delete** button. You are asked to confirm the deletion of the task.

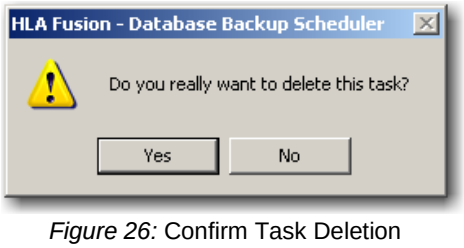


Figure 26: Confirm Task Deletion

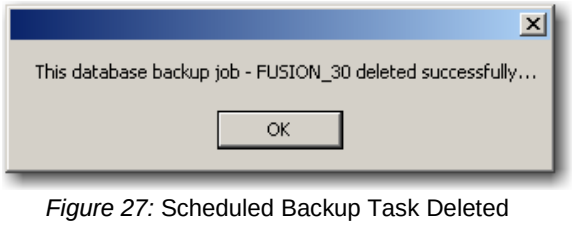


Figure 27: Scheduled Backup Task Deleted

4. Click the **Yes** button to delete the scheduled backup. If your scheduling has deleted, the following message is displayed. Click the OK button to return to the main Database Utility Screen.

To create a new backup task, follow the steps for Scheduling a Backup in the prior section.

Restoring a Database

You can use database backups to restore, (replace) a database. The backup database copy contains all HLA Fusion data up through the date of the backup creation.

You can restore a database backup to any existing, or new database - except for the current database. If you wish to restore a database backup for the current database, use the **Merge Database** feature.

Restoring a database can only be performed on the server or the computer where the backup database file resides.

1. Within the **Database Utility** window, click **Restore Database**.

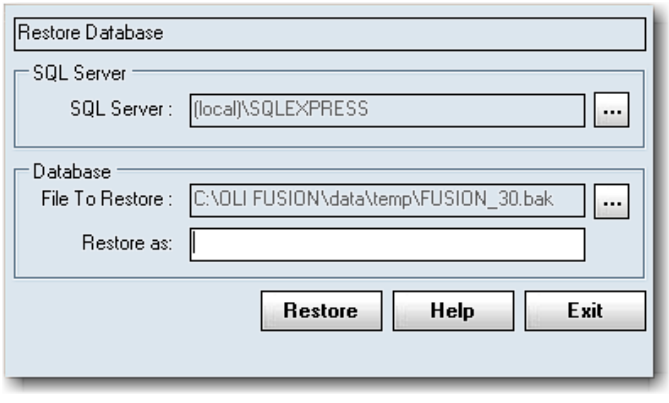


Figure 28: Prepare to Restore Backup

2. Click on the **browse** button [...] next to **File To Restore** text box. This brings up the File Selection window.

3. Browse to select the database backup file, (will have a **.bak** extension) to restore and click the **Open** button.

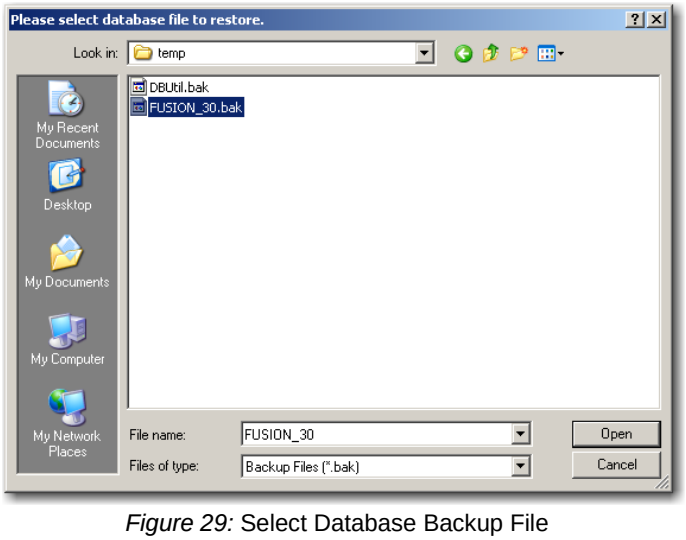


Figure 29: Select Database Backup File

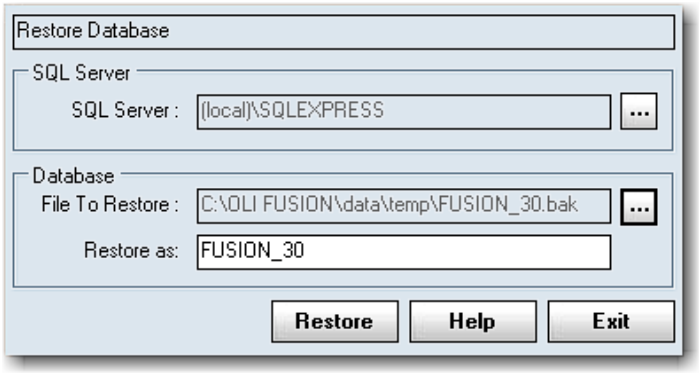


Figure 30: Enter Database Restore Name

4. Enter a unique name for the restored database in the **Restore as** field.

5. Click the **Restore** button and the following message is displayed.

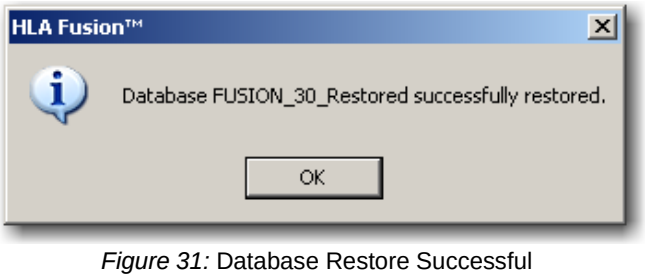


Figure 31: Database Restore Successful

6. Click **OK**. The database is restored using the specified backup file.

Note: SQL Server does not allow you to restore databases from certain locations, such as from a network drive or from a backup file on your computer desktop.

Merging Databases

This function allows you to combine two databases into one, regardless of their location. There are certain guidelines to follow when merging databases:

- Both databases must be the same version of an HLA Fusion Research database.
- Both databases should be backed up before performing a database merge.
- The source database information is copied into the target database.
- When merging into an *existing* HLA Fusion Research database, ensure that destination database size is big enough to store the source database if you are merging into an existing database. By existing database, we mean that it has lab and user information at minimum. The source database lab data will be copied if it is missing from the target database.
- When merging into a *new* HLA Fusion Research database, first create a new database using the **Create Database** function and make the size large enough to accommodate the source database.
- Note that **Donor Group Names**, **Patient ID's**, **Test Types** and **Test Dates** will not be merged if this information already exists in the Target Database.

1. Within the **Database Utility** window, click **Merge Database**.
2. Select a database from the **Database Name** drop-down list under **Source Database**. The version, size and settings for that database are displayed.

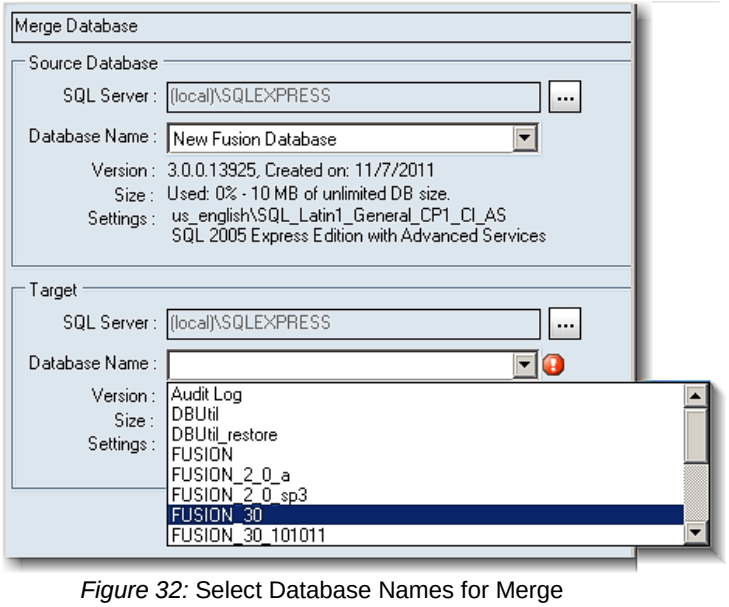
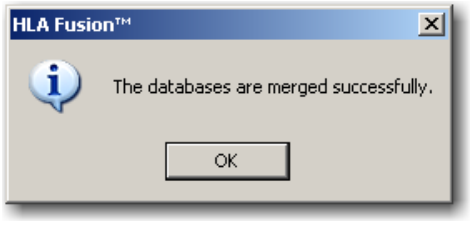


Figure 32: Select Database Names for Merge

3. Select a database from the **Database Name** drop-down list under **Target Database**. The version, size and settings for that database are displayed. You must look at the version, size and settings of both the source and target database before merging to verify the version and settings match and that the size of the source database is not too large for the target.

Note: HLA Fusion checks the MesfEquivalent and MesfNormal columns in the well data table for NaN or infinity values, and replaces these with a null or empty space. These columns have been found to contain inconsistent data in earlier versions of One Lambda software. Occasionally a database merge may fail due to an incompatibility of collation (data handling rules established when the database is created) between the source and target databases. For more information, please refer to **http://support.microsoft.com/kb/325335**.

4. Click the **Merge** button.



After the Merge is completed, the following message is displayed.

Figure 33: Merge Completed

5. Click the **OK** button to return to the main Database Utility Screen.

Create/Select an Audit Log Database

This function allows you to create a database as an **Audit Log** to record all user activity in HLA Fusion Software.

1. Within the **Database Utility** window, click **Create/Select Audit Log Database**.

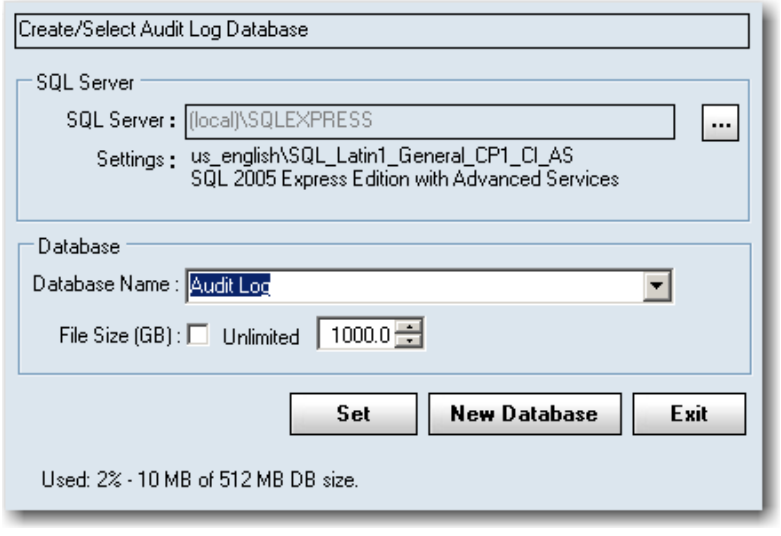


Figure 34: Create/Select Audit Log Database

2. Do one of the following:
   - Select a database from the **Database Name** drop-down list and click **Set**.
   - Or, enter a unique Database Name in the **Database Name** field and click **New Database**.

   A message is displayed confirming audit log database creation and asking whether you want to connect to it.

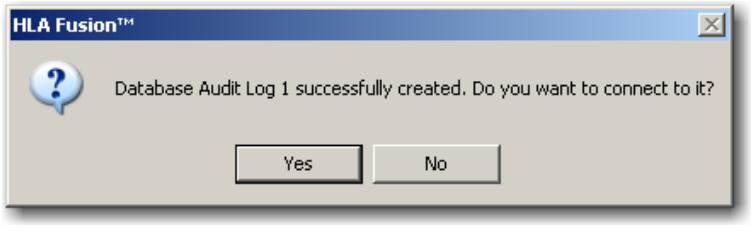


Figure 35: Audit Log Creation Confirmation

3. If you want to connect to the audit log database now, click **Yes**. Otherwise, click **No**.

   If you choose to connect, a message displays to confirm the connection.

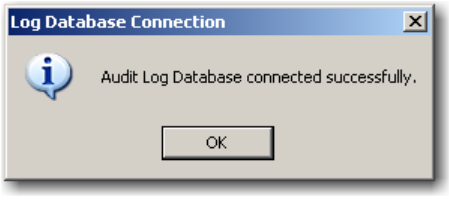


Figure 36: Audit Log Connection

Lab Supervisors can access the Audit Log from the HLA Fusion Home page by clicking **Reports** on the Fusion toolbar. At the Reports screen, select **Miscellaneous**, followed by **Audit Trail Log**.

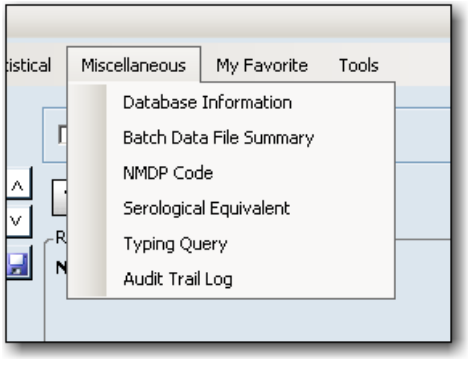


Figure 37: Access Audit Trail Log

Optimizing a Fusion Database

Optimizing a Fusion Database on a regular basis speeds up the analysis process by compacting wasted space, automatically repairing errors and optimizing data storage.
To optimize a Fusion Database, do the following:

Open the HLA Fusion Database Utility.

1. Select **Optimize Database** from the Database Tasks Menu.

2. Select the database you want to optimize from the Database Name drop-down.

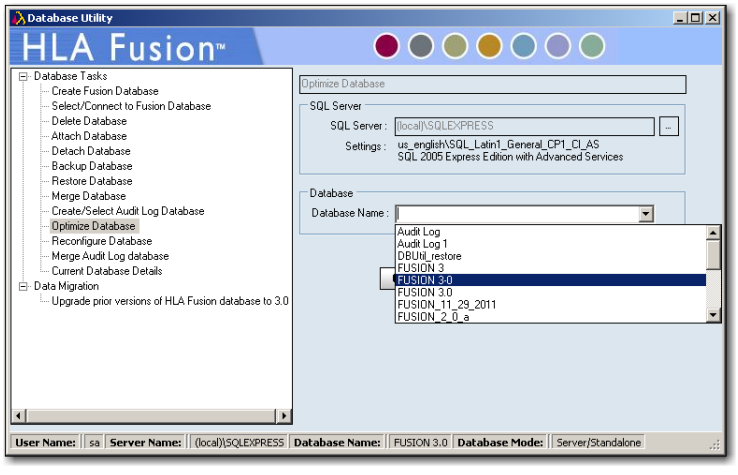


Figure 38: Select Database to Optimize

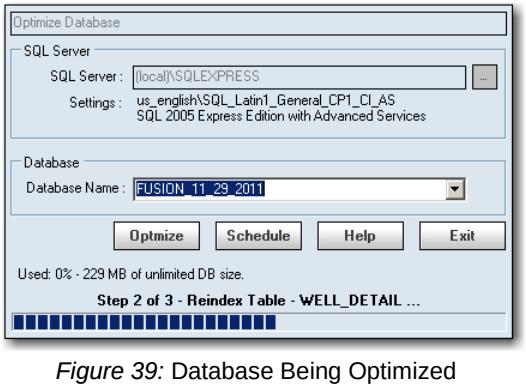


Figure 39: Database Being Optimized

3. Click the **Optimize** button.

When the database optimization is completed you'll see a message indicating that the process was completed successfully.

Note that during optimization, SQL Server will temporarily require additional hard drive space to complete the process. If the additional hard drive space is not available, or your database exceeds the size limitations of SQL Express during optimization, the process may fail.

Here are a few suggestions to solve this problem:

1. Reduce the size of the database by moving sessions from the current database to another database.
2. If you're using SQL Server 2005 Express, (which has a four gigabyte size limitation) consider upgrading to SQL Server 2008 Express, (R2) which allows a larger, ten gigabyte database size.
3. Purchase the full version of MS SQL Server which offers a nearly unlimited database size.

A database can be optimized automatically in the same way that a database can be backed up on a pre-set schedule.

Scheduling Database Optimization

Setting the Fusion Database Utility to automatically perform database optimization is accomplished in exactly the same way as scheduling an automatic database backup.

1. Select **Optimize Database** from the list of database tasks in the Fusion Database Utility.
2. Select the database you want to schedule optimization for from the **Database Name** drop-down list.
3. Click the **Schedule** button.

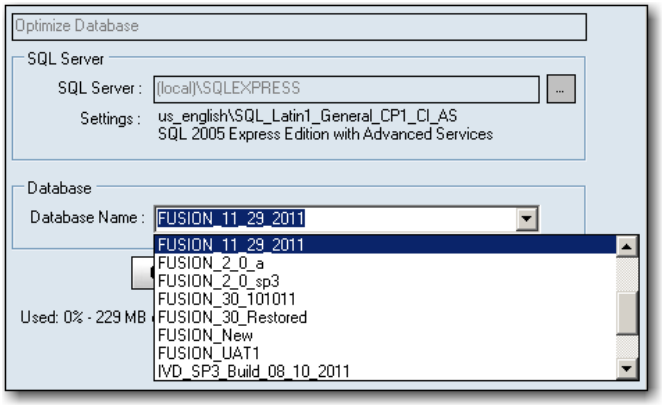


Figure 40: Choosing Database to be scheduled for

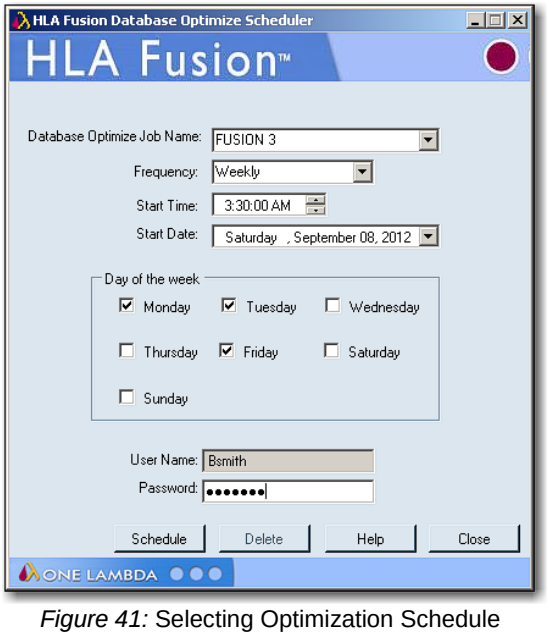


Figure 41: Selecting Optimization Schedule

4. Create a new Database Optimization **Job Name**, or select an existing **Database Optimization Job Name** from the drop-down list.
5. In the next field, **Schedule Optimize**, select the frequency that you want the optimization to run: Daily, Weekly or Monthly.
6. In the **Optimize Time** field, use the up and down arrows to select a time when the database optimization process will begin.
7. In the **Start Date** field, click the down arrow and choose the first day on which you want the database optimization to run.
8. If you selected Weekly in the Schedule Optimize field, select the day, or days, you want the database optimization to run in the **Day of the Week** section.
9. Enter your User Name and Password, and click the **Schedule** button.
10. The Fusion Database Utility will display a message indicating that the Database Optimization job has been successfully scheduled.

Note: The computer or server on which the Fusion Database resides must be turned on at the same time the optimization job is set to begin.

Reconfiguring a Fusion Database

Reconfiguring a Fusion Database allows you to increase the size of an existing database.

Note: If you are using Microsoft SQL Express and you selected **Unlimited** as the database size when the database was initially created, the size of your database can not be increased because it is already at the maximum size allowed by Microsoft SQL Express.

To reconfigure and increase the size of an existing Fusion Database, please do the following:

1. Select **Reconfigure Database** from the list of **Database Tasks** in the Fusion Database Utility.
2. Ensure that you're connected to the correct **SQL Server**.
3. If not, click the ... **Browse Button** in the **SQL Server** section to select the correct SQL Server.
4. Choose the database that your want to reconfigure by clicking the down arrow at the right side of the **Database Name** field to select it.

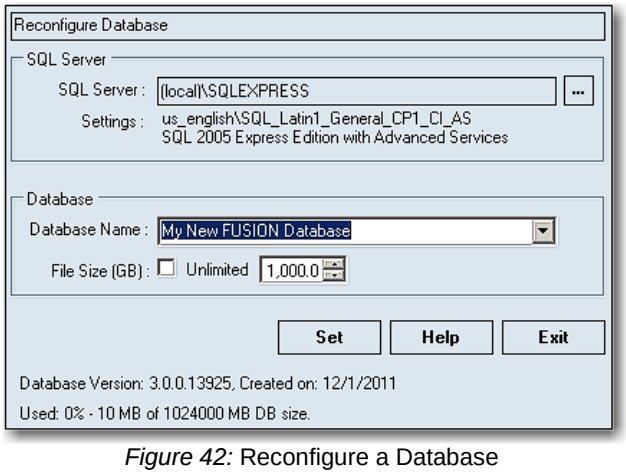


Figure 42: Reconfigure a Database

   a. Increase the size of the database by typing a new size, or by clicking the up and down arrows in the field just below the Database Name,

   b. **Or** increase the database size to its allowable maximum size by placing an arrow in the **Unlimited** size box provided for this purpose.

5. Click the **Set** button.
6. The Fusion Database Utility will display a message that the database reconfiguration was successful.

Merging an Audit Log Database

If you've merged two Fusion Databases together, you may also want to merge the associated Audit Log Databases. The process is similar to merging Fusion Databases together.

Note: It's always best to backup databases before merging them together.

Within the Fusion Database Utility, select **Merge Audit Log Database**.

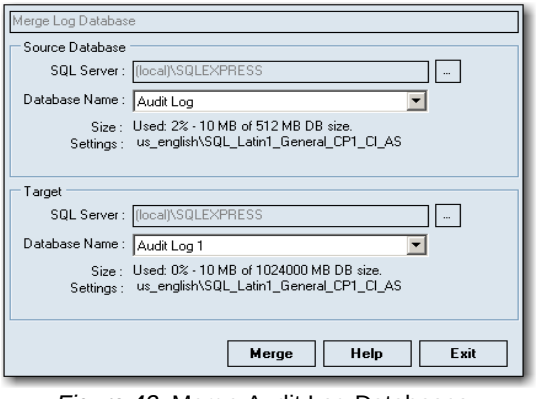


Figure 43: Merge Audit Log Databases

The Merge Audit Log feature of the Fusion Database Utility is divided into two sections. The top part, or **Source** Audit Log Database, can be merged into the **Target** Audit Log Database at the bottom.

1. In the **Source** Database section, click the drop-down arrow on the right side of the **Database Name** field and select an existing Audit Log Database name.
2. In the lower, **Target** Database section, use the drop-down arrow to select the existing Audit Log Database into which the Source Audit Log Database will be merged.
3. Click the **Merge** button.

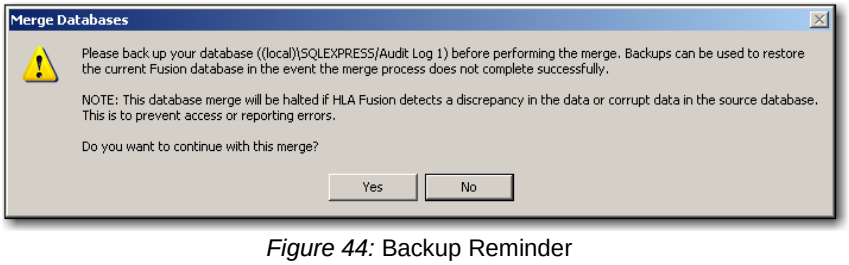


Figure 44: Backup Reminder

The HLA Fusion Database Utility displays a reminder that databases should always be backed up before performing a merge.

4. Click the **Yes** button to continue with the merge.

If the Audit Log Database merge was successful, you'll see this message:

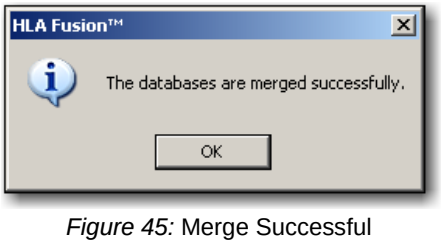


Figure 45: Merge Successful

Current Database Details

Selecting **Current Database Details** from the menu on the left side of the Database Utility brings up a detailed listing of the most important information concerning your Fusion databases.

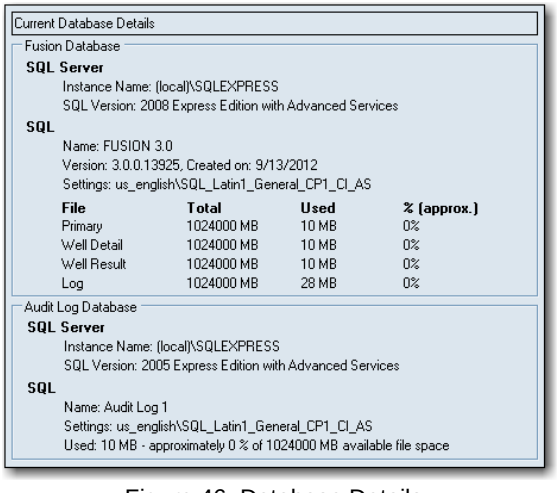


Figure 46: Database Details

The top part of this screen deals with the main Fusion database while the bottom section is devoted to the Audit Log database.

If the percentage of a database file exceeds 90%, it may be time to Optimize and/or Reconfigure to free up more space.

Data Migration

Upgrade Prior Database Versions to HLA Fusion Database 3.0

You can use this tool to upgrade a database created with a previous version of HLA Fusion to HLA Fusion version 3.0.

1. Within the **Database Utility** window, select **Data Migration** and click **Upgrade prior versions to HLA Fusion database 3.0**.

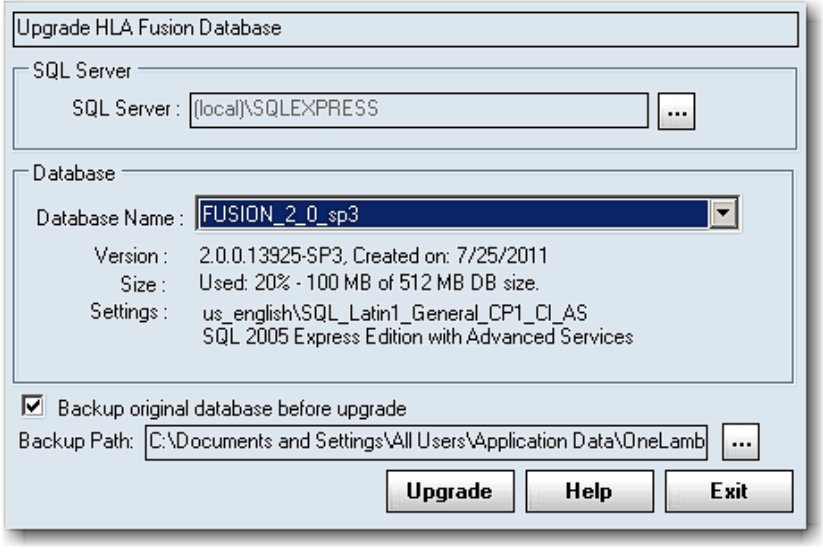


Figure 47: Upgrade Fusion Database

2. Select your SQL Server instance by accepting the default, or by clicking the browse button ... on the right side of the **SQL Server** field.
3. From the **Database Name** drop-down list, select the Fusion database you want to upgrade.
4. If you want to back up the database before it is upgraded, click the Browse Button ... and select a location for the backup. This location will appear as the **Backup Path**.
5. Place a check mark in the box next to **Backup original database before upgrade**.
6. Click the **Upgrade** button. This makes a backup of your original database and upgrades it to the most current HLA Fusion format.

7. Note that during the database upgrade, SQL Server will temporarily require additional hard drive space to complete the process. If the additional hard drive space is not available, or your database exceeds the size limitations of SQL Express during the upgrade, the process may fail.

Here are a few suggestions to solve this problem:

1. Reduce the size of the database by moving sessions from the current database to another database.
2. If you're using SQL Server 2005 Express, (which has a four gigabyte size limitation) consider upgrading to SQL Server 2008 Express, (R2) which allows a larger, ten gigabyte database size.
3. Purchase the full version of MS SQL Server which offers a nearly unlimited database size.