GeoDatabases

Working with a Desktop GeoDatabase

World Food Programme
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**Introduction**

The GIS training “Working with a Desktop Geodatabase” is part of the collection of trainings on geodatabase management produced by the Geospatial Support Unit (GSU) to support the implementation of the GIS Infrastructure in the World Food Programme.

This specific training module has been designed with the aim of guiding the user through the installation of an ESRI Desktop Geodatabase on a desktop or laptop computer, its configuration and management.

The manual is divided into two main sections: in the first part the user will follow some steps needed to have an instance of SQLServer Express up and running and install some additional libraries to turn the SQL Server instance into an ESRI Desktop GeoDatabase; in the second section a complete list of configuration and maintenance task are described in order to enable users who take this training to independently manage their own Desktop GeoDatabase.

1. **Installation of an ESRI Desktop GeoDatabase**

   The license needed for the installation of a Desktop GeoDatabase comes with ArcGIS Desktop license and the software can be downloaded from the ESRI portal, if not available yet. It can be installed on a normal Desktop or Laptop computer, running Windows Operating System.

   Log in to the computer as a user with administrative privileges and make sure you have.NET Framework 3.5 Service Pack (SP) 1 on it.

   In order to launch the installation, click on the Setup link corresponding to the ArcSDE for Microsoft SQL Server 2008 R2 Express (Personal) on the main page of the ArcGIS for Desktop software.
In order to proceed with installation click on the Next button in the setup wizard window that will appear.

The installation is made on two steps:

I. the first step lets you install the Microsoft SQL Server Express instance on your machine;

II. the second step enables the geodatabase storage on the database instance, which turns an SQL Express databases into a Desktop GeoDatabase by installing all necessary system tables.
1.1 Installation of Microsoft SQL Server Express instance

In order to proceed with installation click on the Next button in the setup wizard window that will appear. The first step begins with the acceptance of the Microsoft License Terms for the SQL Server Software.
Then you should define the SQL Server software components that you would like to install on the machine. **Make sure that Management Tools - Basic is selected** and click Next.
In the following step you have to define the instance ID, which is the name of the SQLServer Express instance that you’re going to create: please take note of the name you enter, because it is needed later in order to connect to the instance itself. **We suggest to leave the default “SQLExpress” and click Next.**

![Figure 5: SQLServer Express instance id](image)

Click *Next*.  

![Figure 6: SQL Server Express Instance](image)
Make note of the domain and user logon highlighted, as this will be used for the ArcSDE installation. By default the user you are using to log into your computer will be defined as administrator, use the Add button if you want to add other administrator at this stage, otherwise it can be done once the installation is completed.

*Figure 7: Domain and user name*

Click Next.
Click Next.

Figure 8: Last step to install SQL Server Express

Figure 9: Installation completed
After clicking on Close you can proceed with the ArcSDE installation (an installation wizard should appear automatically after few seconds).

### 1.2 Installation of the ArcSDE libraries for SQL Server Express

These steps consist in installing all the SDE system tables and stored procedures into the database instance created at the previous step. Please note that at this step no geodatabase is created into the database instance. The geodatabase creation must be done at a later step.

In the first window that opens you should insert the name of the SQL Server instance in which you want to enable the geodatabase storage and the Windows Login account that you would like to use for Administration purposes (such as creating geo-databases and managing users).

SQL Server instance name: `machinename\SQLExpress`
Windows Login: `GLOBAL\user.username`

Example:
SQL Server instance name: `WFPPH-FZWR22S\SQLExpress`
Windows Login: `GLOBAL\juanito.berja`
The last window acknowledges the correct installation of the SDE component into the database instance.
Figure 11: Installation completed
2 Configuration and management of a Desktop GeoDatabase

2.1 Generation of a connection file to connect to SQLServer Express

In order to connect to the SQL Express instance and create a new geodatabase, a Server Connection file is needed.

1. Open ArcCatalog;
2. Search for the Database Servers folder and double-click “Add Database Server” function;
3. Insert the SQL server instance name, the same that you entered during the installation steps (example: SQL Server instance name: WFPPH-FZWR22S\SQLExpress).
At this point a connection file is created under the Database Servers folder. This connection file will allow you to create new GeoDatabase in the Database Server and perform the main maintenance tasks.

### 2.2 Create a new GeoDatabase into the SQL Server Express instance

Please note that during the installation steps, no geodatabase is created into the SQL Server Express instance. You can create as many GeoDatabases as you need at a later step, by right-clicking the Database Server connection file that you created at the previous step and then clicking on “New Geodatabase...”.
After clicking OK the new geodatabase should appear within the Database server:

![New Geodatabase dialog box]

2.2.1 Create Database Connection

At this point you need to create a database connection file to connect directly to the database you have just created. To do so right click on the database and select “Save Connection”.
This will create the connection file within the Database Connections folder. It’s strongly suggested to rename the connection file including the database name.

2.2.2 Allow other users to connect to your SQLServer Express instance

At this stage you are the only one that can access your SQLServer Express Database. To grant access to others users you have to:

1. Open SQLServer ports on your firewall
2. Add users to your Database Server
3. Grant permission to users

2.2.2.1 Open SQLServer ports on your firewall

You can find here instructions to create rules that allow traffic on the ports used by SQLServer Express in case your Operating System is Windows 7.

Open the Control Panel and navigate to Windows Firewall.
Click on Advanced Settings on the left hand side and you should see the Windows Firewall with Advanced Security. Select the Inbound Rules on the left hand side and click on New Rule... on the right hand side.
This opens the New Inbound Rule Wizard, which you can use to allow inbound traffic on Port 1433 for TCP/IP and 1434 for UDP.
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**New Inbound Rule Wizard**

**Action**

Specify the action to be taken when a connection matches the conditions specified in the rule.

- **Allow the connection**
  - This includes connections that are protected with IPSec as well as those that are not.

- **Allow the connection if it is secure**
  - This includes only connections that have been authenticated by using IPSec. Connections will be secured using the settings in IPSec properties and rules in the Connection Security Rule node.

- **Block the connection**

Learn more about actions

**Profile**

Specify the profiles for which this rule applies.

- **Domain**
  - Applies when a computer is connected to its corporate domain.

- **Private**
  - Applies when a computer is connected to a private network location.

- **Public**
  - Applies when a computer is connected to a public network location.

Learn more about profiles

< Back  Next >  Cancel
Follow the same process to create a rule to allow inbound UDP traffic on port 1434 and you should be able to access your SQL Server remotely. In case it doesn’t work disable the firewall or ask your IT officer.
2.2.2.2 Add users to your database server

Open ArcCatalog, right click on your Database Server Connection and select the Permissions... option.

The window below will appear, click on the Add User button.
Then click on Locations to select the Global WFP domain (Expand Entire Directory and select global.wfp.org).

Then click on Advanced, search for the user you would like to add and click on Find Now. Such user should appear in the window below, double click on it to add the user to the list and then click on Apply to finalize the process.
To grant Administrative privileges to the user tick the Server administrator checkbox.

### 2.2.2.3 Grant permission to users

Once you have added additional users to your Database Server you can grant them privileges on each geodatabase.

Right click on the geodatabase and, Select Administration and then Permissions....
Select a user in the list and tick the option you prefer:

- No Database permissions
- GeoDatabase Administrator
- Read Only
- Read\Write

Click apply to finalize the process.
3 Geodatabase maintenance

Geodatabase maintenance on SQL Server Express is demanded to ESRI ArcCatalog (or to the Catalogue windows on ArcMap).

In order to access to maintenance commands, you should access the geodatabase with the geodatabase administrator account through ArcCatalog.

If you connect with a database server connection file (.gds), right-click on the geodatabase name, then access Administration (see screenshots below), you will have access to the following two maintenance commands:

- Compress Database
- Geodatabase Maintenance
3.1 Compress Database

The compress operation removes the states that are no longer referenced by a version and can move rows in the delta tables to the base table. For more information on what the compress operation does and why you would use it, see The geodatabase compress operation.

Click on the Compress Database button, you will get a confirmation window (see below). Just click on yes and the compression operation starts.

Geodatabase maintenance

When you click on Geodatabase Maintenance button you’ll find the following window. Enable all the three check boxes and click “OK” in order to run the maintenance process.
3.2 Analyze

The Analyze command is used to update statistics on your geodatabase in order to optimize queries. The SQL Server Query Optimizer uses database statistics to determine the distribution of values in an index. Over time, as the data is edited, the statistics no longer represent the true distribution of data in the indexes and tables. Therefore, if your database statistics are out-of-date, query performance can be negatively affected. Updating statistics after the tables and other data objects in the geodatabase have changed helps optimize query performance.

SQL Server Express is set to automatically update statistics by default. Therefore, in most cases, you do not need update statistics in a geodatabase on a database server.
3.3 Rebuild Indexes

After a large number of edits or a database compress operation, your indexes may become fragmented. This probably will not affect performance to any great extent in a geodatabase on a database server (a SQL Server Express instance), but rebuilding indexes may give you a small performance boost.

3.4 Shrink geodatabase

Over time, as data is deleted and added, the data files within your geodatabases may break into increasingly smaller, scattered fragments. This can cause performance degradation because queries have to scan an increasing number of separate files to access the data the first time it is queried or when it is updated. To correct this, you can shrink geodatabases stored in SQL Server Express. Shrinking the geodatabase rearranges how the database is stored on disk, reducing the size of the data files.