First TUFMAN Training Workshop (TTW-1)

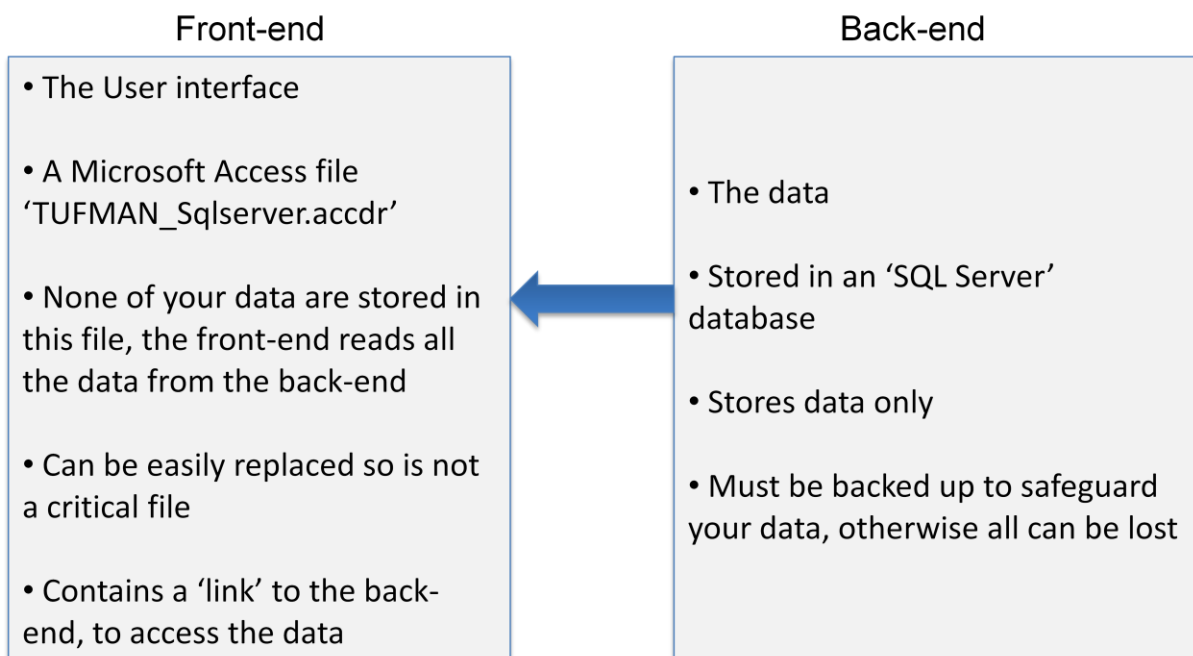3-7 December 2012

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Session 3.0

Technical Details of TUFMAN

INTRODUCTION

This document presents some of the technical details of the TUFMAN database system, to give a better understanding of how it works and some of the common technical problems and maintenance issues. It also shows some of the main maintenance requirements, hardware requirements, and backups.

COMPONENTS OF TUFMAN

TUFMAN is similar to most database systems and has 2 main components, referred to as a 'front-end' and a 'back-end'. The back-end is where all of the data are stored, which is SQL Server 2008 R2, a database product by Microsoft. The back-end is basically only data; you can't view or edit the data without some software to access it with. This is what the front-end does; it has virtually no data in it and is simply a computer program that gives a user interface to access the data.

Front-end

- The User interface

- A Microsoft Access file 'TUFMAN_Sqlserver.accdr'

- None of your data are stored in this file, the front-end reads all the data from the back-end

- Can be easily replaced so is not a critical file

- Contains a 'link' to the back-end, to access the data

Back-end

- The data

- Stored in an 'SQL Server' database

- Stores data only

- Must be backed up to safeguard your data, otherwise all can be lost

Splitting the database system into 2 components like this has several advantages:

- Updates to the user interface are easy, just replace the front-end file
- The data are much more secure when separated like this, SQL server data cannot be copied like a normal file and can only be accessed using special tools and having the security access
- Backups are handled better by SQL Server
- SQL Server is stable and reliable

There are many more, but it is sufficient to say that this is the optimal way to set up a database system. The key point is that the TUFMAN_SQLServer.accdr file that most people associate with TUFMAN is only half of the system, and in fact stores no data itself. If someone was to create a copy of your TUFMAN_SQLServer.accdr file with the hope of stealing your data, they would get nothing.

SQL Server Back-end

What exactly is SQL Server? SQL Server is a computer program designed to host databases and provide tools to manage them with. It can be run on any computer but is best run on a proper server computer, running Windows Server. It is a very powerful database product that is robust, secure, and high performance. In addition it has tools for easily making backups and server-based functionality that allows for faster queries and processes (e.g. linking data to a license).

The TUFMAN_SQLServer file must connect to the SQL Server database to be able to read and write data, which we call 're-linking' in TUFMAN. This is covered in the 'TUFMAN Administration' document, but it is worth mentioning here that TUFMAN contains an internal table (not located on the SQL Server database) that holds all of the information required to perform the link. There is one record for every required link which is why you need to select from the 'country profile' list before re-linking TUFMAN. Each link basically contains:

- The SQL Server name and address – which is either the server name or IP address and the SQL Server instance name, i.e. a network link to the SQL Server
- Database name – e.g. 'tufman_fm'
- User name and password for the connection (a special 'sa' account)

If a new installation of TUFMAN is being setup, e.g. on a laptop for the first time or a new server, then the connection details have to be added or changed in this table in TUFMAN, otherwise it won't be possible to re-link TUFMAN. This is done by SPC and requires an update to the TUFMAN_SQLServer file.

Support Files

Apart from the main Microsoft Access file, TUFMAN_SQL Server.accdr, there are a few other files and folders required for full functionality of TUFMAN:

- **'Maps' folder** – This folder is required for the mapping functions of TUFMAN and contains a number of files used for mapping, such as the EEZ boundaries, island shapes etc. It should be in the same folder as the TUFMAN_SQLServer.accdr file.
- **'WCPFC_templ' folder** – This folder is required for the WCPFC reporting functions of TUFMAN and contains some Excel template files used in those reports. It should be in the same folder as the TUFMAN_SQLServer.accdr file.
- **'logo' folder** – This folder is optional and contains a single file 'logo.jpg'. the logo.jpg file is what you see on the main screen of TUFMAN, so it is actually very easy to change this just by changing the logo.jpg file, which should be large enough to look good when TUFMAN is viewed full screen. It should be in the same folder as the TUFMAN_SQLServer file.

There may be other files and folders used for certain TUFMAN installations, but are not required for all:

- **License certificates** – Word doc template files used for license certificates
- **'Backups folder'** – this folder could contain files, or a link to files, which are backups of the SQL Server database, i.e. the actual TUFMAN data.
- **TUFMAN_Master** folder – this folder will contain only one file, a backup of the TUFMAN_SQLServer.accdr file, in case you need to replace it for some reason.

TUFMAN NETWORK SETUP

As mentioned already, TUFMAN is split into a front-end and back-end, the back-end being the SQL Server database. This is setup on a server machine which is accessible to computers connected to the network. These could be desktop PC's or laptops, and can be connected by network cable or connected wirelessly. When running TUFMAN, each of these machines will run the TUFMAN_SQLServer.accdr file, which will connect to the SQL Server and allow TUFMAN to read data from and write data to the database:
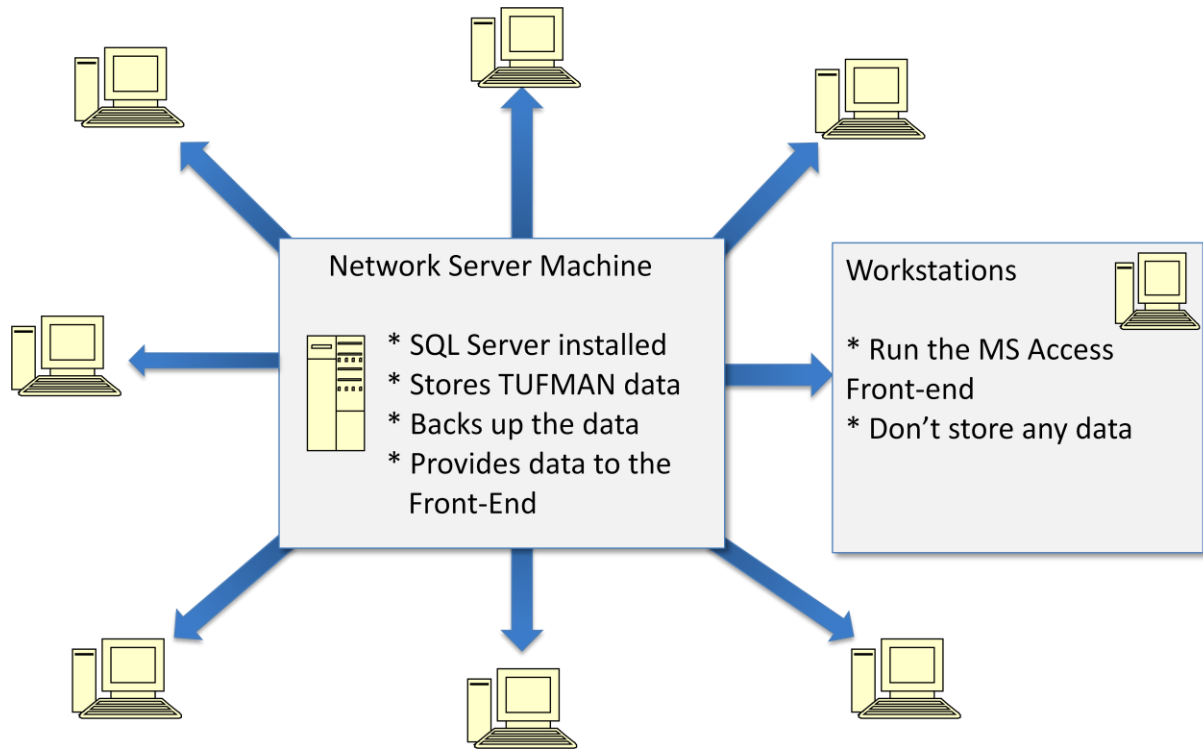
Network Issues

With any network-based service or software, there are some setup and performance issues. The main ones for TUFMAN are:

- The network must be setup to allow the workstation PC's to access the TUFMAN SQL Server database (firewall has to be configured etc)
- Problems with the server or network will slow TUFMAN down or make it not work at all, since the front-end is always sending and receiving data over the network to the SQL Server database.
- Changes to the server may result in TUFMAN losing access to the SQL Server, so changes to the server must be done carefully and with the TUFMAN setup in mind (e.g. Change the server name, IP address, firewall, SQL Server setup)

There is usually a network administrator to handle these issues but these days it is possible to resolve certain problems remotely, for example using a special tool like Teamviewer that allows an external person to access a machine on the network.

TUFMAN Setup on a Laptop

Generally this is to install a copy of TUFMAN so that the reports etc can be viewed while travelling. No data should be entered in this case

- SQL Server is installed on the laptop and a copy of the TUFMAN data installed into the SQL Server
- TUFMAN is then linked to the laptop data
- You can have as many laptops setup with a copy as you like, but the data will not be updated. Once back in the office TUFMAN should be linked back to the main server's TUFMAN database
- When linked to a copy, TUFMAN will show this on the Main Title (as 'TUFMAN – COPY') and won't allow data to be entered.

Hardware and software requirements

These are the basic requirements to have a full TUFMAN setup:

For the TUFMAN Server:

- 2GB RAM or more (8GB recommended)
- X86 processor at 1.0GHz or x64 processor at 1.4GHz
- 10GB minimum available hard drive space

- Windows Server 2008
- Network
- SQL Server 2008 R2

For the workstations, or laptops, running TUFMAN:

- 1GB RAM
- 1.0GHz processor
- 5GB available hard drive space
- Windows XP (Windows 7 recommended)
- Microsoft Access 2007, or Access 2007 runtime (free)
- Microsoft Excel 2007 recommended
- 1024x768 or higher resolution monitor
- Network access

Backups

Since TUFMAN has a separate back-end database in SQL Server, backing up the data requires backing up the SQL Server database. Backups are setup automatically and are run every night on your server, but it is possible to make a backup at any time.

Automatic backups

The automatic backups work via a 'scheduled task' on the server. A scheduled task is simply a task that has been setup to run at a certain time of the day, for a certain day or days. The TUFMAN backups are set to run each evening, after working hours, and on week days.

When the scheduled task is activated by the server, it runs a specific 'script', a list of commands that launch certain programs that run the SQL Server backup and save the file to a dedicated area. The backups are saved to a folder on the server and usually copied to other folders, such as removeable storage on the server (a USB key) and maybe another folder on the network that is accessible by users.

The backup file is usually zipped, with the original file being named something like 'Tufman_fm_daily.bak', so the zipped filename will be 'Tufman_fm_daily.zip'. When you send a copy of your data to SPC, it is this file (the most recent) that you would send.

Manual backups

There is a TUFMAN Guide (TUFMAN GUIDE - Backup and Restore the TUFMAN Database.pdf) describing all of the steps to make a manual backup. The full steps won't be presented here, but the steps basically are:

- Open 'SQL Server Management Studio', this can be on the server or from another machine
- Connect to the TUFMAN database
- Run the 'backup' task. This will create a backup file on the server

Restoring from a backup

Restoring from backup is also described in the 'TUFMAN GUIDE - Backup and Restore the TUFMAN Database.pdf' document. The full steps of a restore also won't be presented here, but the steps basically are:

- Open 'SQL Server Management Studio', this can be on the server or from another machine
- Connect to the TUFMAN database
- Delete the existing database if it's being replaced (caution is required here of course)
- Run the 'restore' task, and then navigate to a previous backup file to restore from. The backup file should be unzipped, it will allow you to select a zipped file but the restore will not work.

You would only run a restore on the server when absolutely necessary. It is very rare for SQL Server to be corrupt and require a restore, but here are some scenarios when you may want to do it:

- When changing to a new server, so the TUFMAN database is moved from an old server to a new one
- Complete server crash and loss of data, or damage to the server
- Accidental loss of data by user error (difficult but not impossible to do)
- Restoring after maintenance by SPC (rare)
- Installing a copy onto a laptop, for travel
- Installing a training TUFMAN database

TUFMAN updates, how version control works

TUFMAN is constantly evolving and has frequent updates. Some of these updates are to the user interface, while others are changes to the structure or functionality of the SQL Server database. For both, all that is required is to update the TUFMAN_SQLServer file. This file contains all of the user interface code, and changes to the SQL Server database are performed when the updated TUFMAN is run for the first time. You will see that such changes have occurred when you get a 'TUFMAN has been updated to version 6.xx'.

The version number is how TUFMAN keeps track of which updates have been applied. The version number is stored in the TUFMAN_SQLServer file, and also in the SQL Server back-end database. When TUFMAN is run, it checks the version number of the SQL Server database, and determines if any updates need to be applied. For example if

- TUFMAN_SQLServer file version is 6.22
- SQL Server TUFMAN database version is 6.17

When TUFMAN is re-linked and run:

- TUFMAN compares, it's version (6.22) to the database (6.17)
- 6.22 is > 6.17, so run updates:
    - 6.18, 6.19, 6.20, 6.21, 6.22
- If updates are successful, update the SQL Server TUFMAN database version number to 6.22, so it is now up-to-date.

Common technical problems

Re-linking problems

Re-linking problems can include loss of connection of TUFMAN to the SQL Server database, which will result in TUFMAN suddenly asking you to re-link. This can occur for a number of reasons:

- Network problems
- Server network changes (name, IP address, etc)
- Server software changes (firewall, SQL Server)

These re-linking problems will need to be fixed by your network administrator, or SPC, or both.

There can also be problems with re-linking an updated TUFMAN_SQLServer.accdb file. These problems are due to differences between versions of Microsoft Office, and are usually easily fixed by SPC who will send another update file to replace the one that wouldn't re-link.

Corruption of TUFMAN_SQLServer.accdr file

Unfortunately it is not uncommon for the TUFMAN_SQLServer.accdr file to become corrupt and be either completely unusable, or suddenly start to produce errors where it didn't before. This can be due to the nature of Microsoft Access but can also occur when the file is open and there is a power cut. You may also notice that the TUFMAN_SQLServer.accdr file gradually gets bigger and bigger as it gets used, and can grow from its initial size of ~40MB up to as high as 700MB, after which it probably won't work anymore. There are ways to reduce the file size, but the simplest way is to keep a backup of the TUFMAN_SQLServer.accdr file and replace it if it has become corrupt or if the file size is starting to be too big.