

## Chapter 15: Synchronisation

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### Introduction

Unless you are in a very small church, and only have one computer on which everything is stored, it is highly likely that you will need to run CMO on multiple computers.

- You have a computer (or multiple computers) where you do the service planning, and another computer at church that operates the overheads.
- You have a team of people who each plan services and update song information.

In both situations you want to keep your data up to date in all locations. If you make a change to the verse order on a song, you want that change to be visible on all your other computers.

There are a couple of ways you can do this. First, there is the manual method. Using this method you would keep track of all the changes you've made, and then create an export file that contains the changes. You would take that export file to the other computers and import it.

If you aren't making many changes that might be workable, but in most cases just keeping track of the changes would be difficult.

If you know that one computer is the "source of truth", that is, all the changes originate from that computer, and all other computers are clones of this one, you could take a backup of the database and restore it on the destination. That is much easier to work with, but there is still the possibility that a change might happen on the secondary computer which is not reflected on the main one, and a restore operation will wipe that change completely.

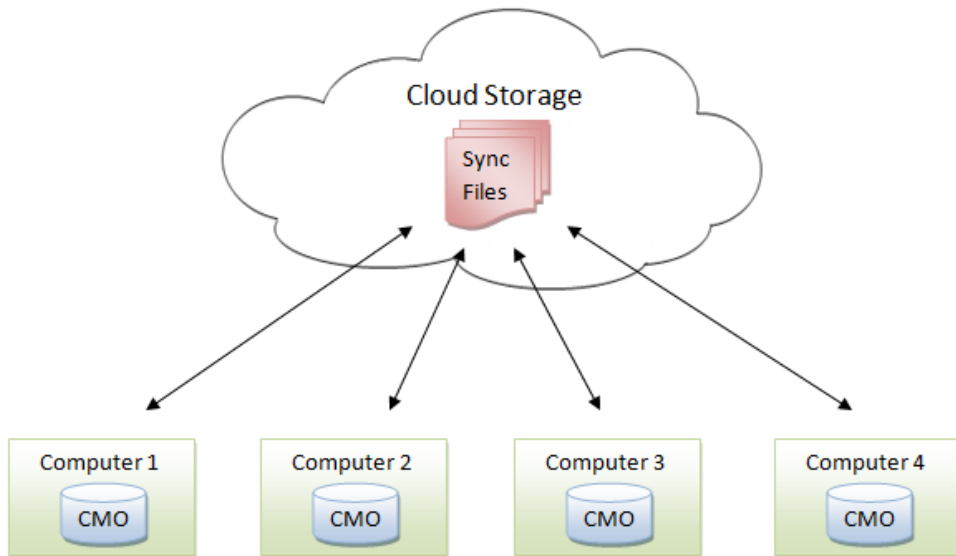
A far more flexible solution would be to package up all the changes on each computer, and then merge them into each database. In that way, changes from all computers can be moved around seamlessly. In CMO, this is called "Synchronisation".

### Cloud storage

Synchronisation makes use of cloud storage to transmit changes. Services like DropBox, Box.com, or OneDrive provide a means to store computer files on the cloud, and then replicate them to other devices. For instance, you might have DropBox installed on two computers. Any file you put into your DropBox folder on one computer will be copied to the cloud and then replicated on the second computer shortly afterwards.

You can also share folders with other users. For instance, you could create a folder in DropBox to store all your family photos, and then share that folder with members of your family so they can see them as well.

It is this functionality that CMO can use to synchronise databases across multiple computers. It works like this:



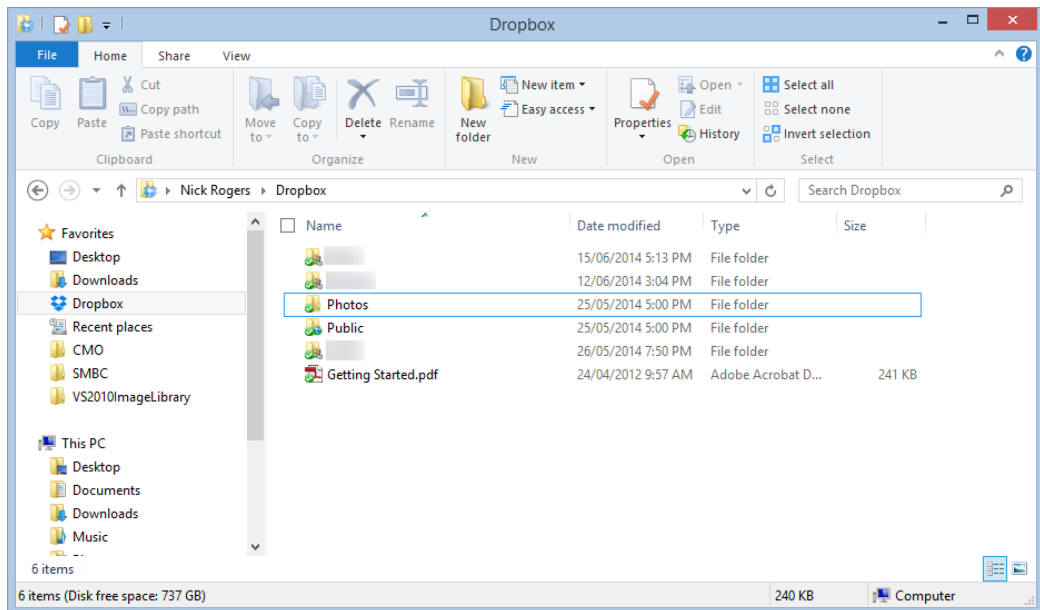
CMO keeps track of all changes that are made on each computer. When the synchronisation process runs, those changes are written out to a sync file in your local cloud storage folder. At that point your cloud storage provide takes over and copies the files to the cloud.

Then, all uses who are sharing that folder will receive the new files. When they synchronise, all the files are read and the changes applied to the database. Any changes on *that* computer are also written to a sync file which is copied to the cloud and then across to all computers.

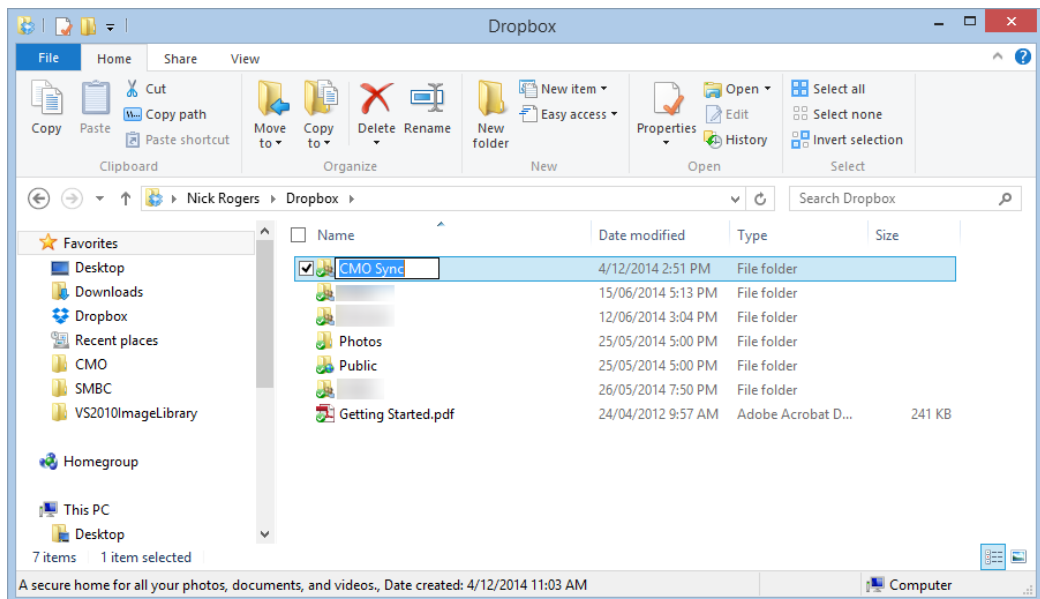
So let's look at how to set this up.

### Configuring your cloud storage

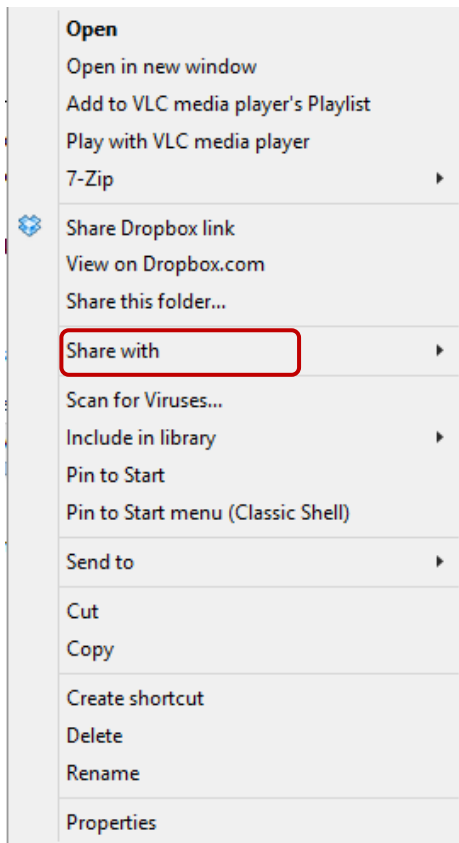
The first step in this process is to create a folder on your cloud storage provide and, if there are other people who need to keep CMO updated, share it with others. For the purposes of demonstration I will be using DropBox.



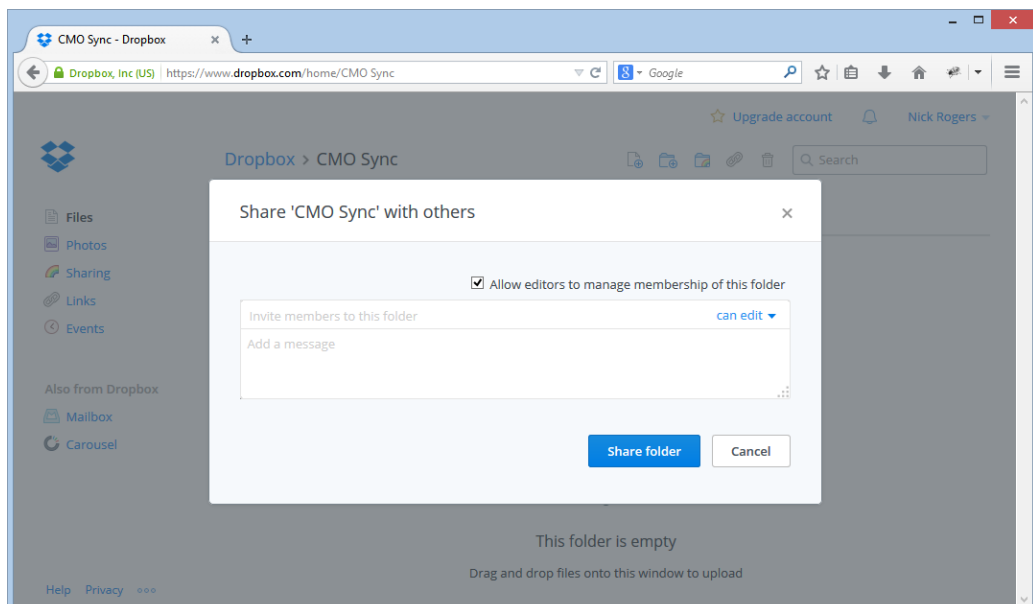
Here is my main DropBox folder. DropBox creates some folders automatically (Public and Photos in particular). Now I want to create a new one. So I add a folder and give it a name.



Once the folder is created I want to share it with other users. When I right click on the folder I get this context menu:



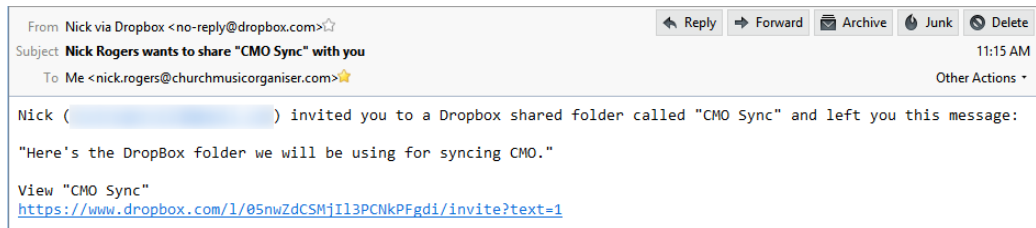
This then opens a window in my browser.



Here I can add the email addresses of all the people I want to share this folder with. The important option here is the "can edit". By default this is set on, but you should make sure that it is on, otherwise the users you invite will not be able to save their own sync files to the folder.

Enter some email addresses, add a message and click on "Share folder".

Each recipient will receive an email similar to the following:

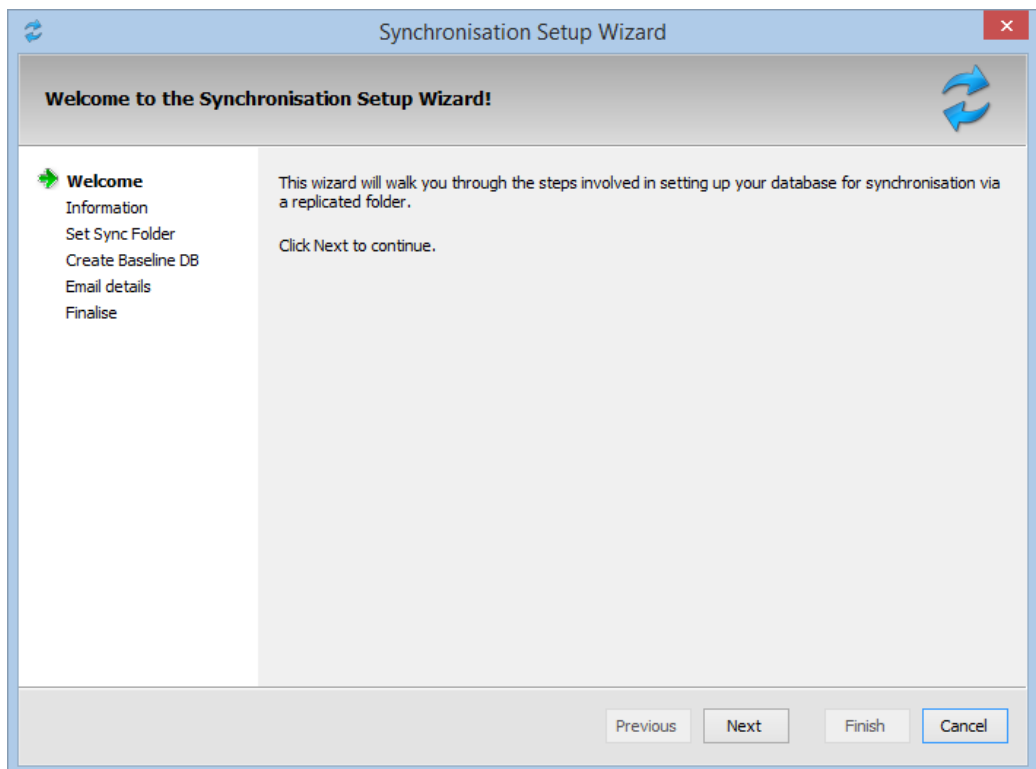


Clicking on the link will then add the shared folder to their local DropBox folder.

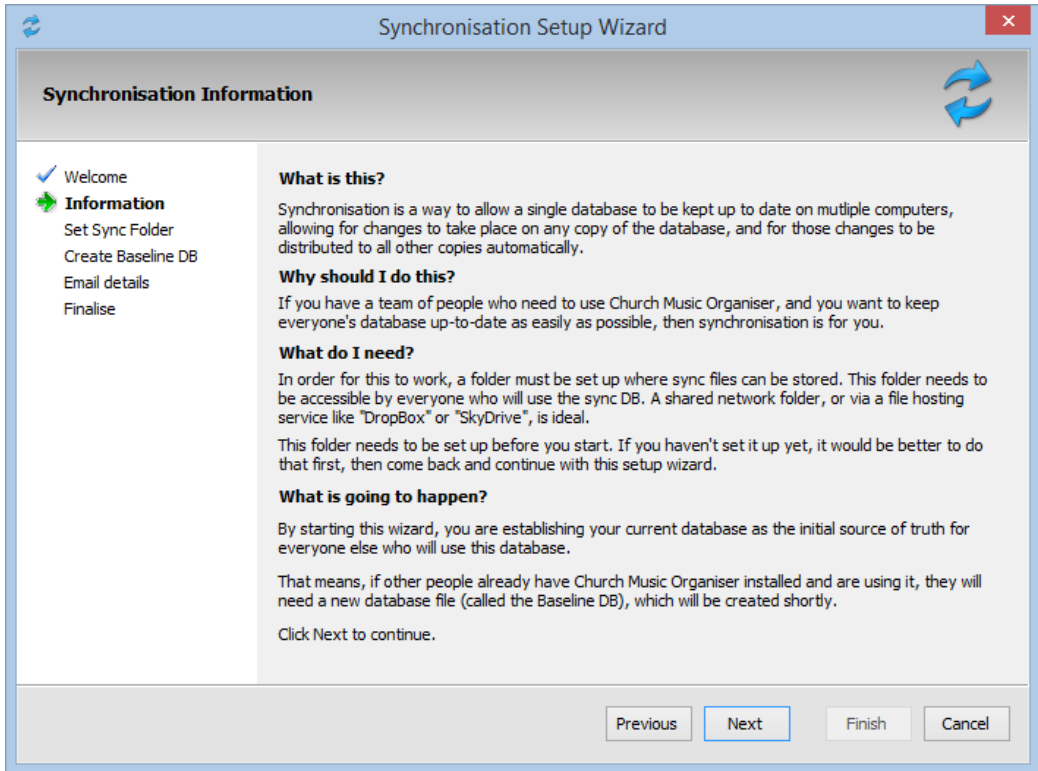
Now that the folder is ready, we can setup CMO use synchronise to it.

### Setting up synchronisation

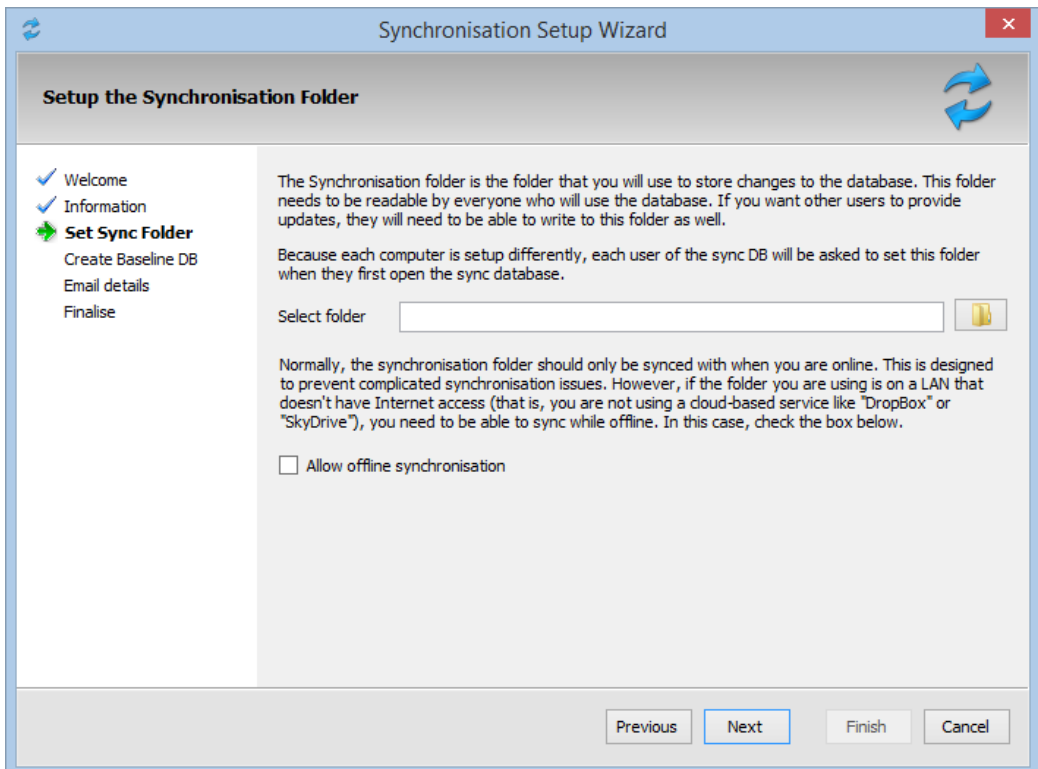
To setup synchronisation, go to the "File → Synchronisation.." menu. The setup wizard will be displayed.



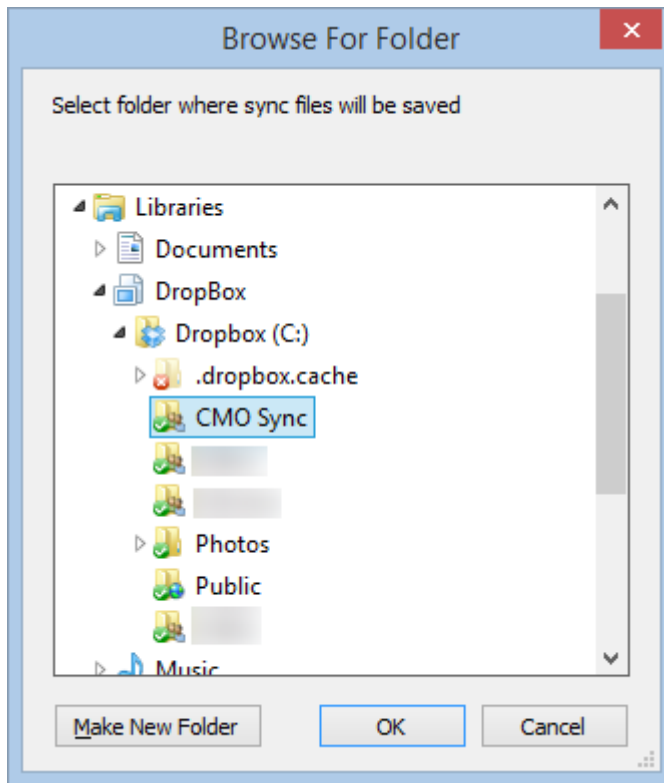
Click "Next" to continue.



This page is just information about the process. Click next to continue.



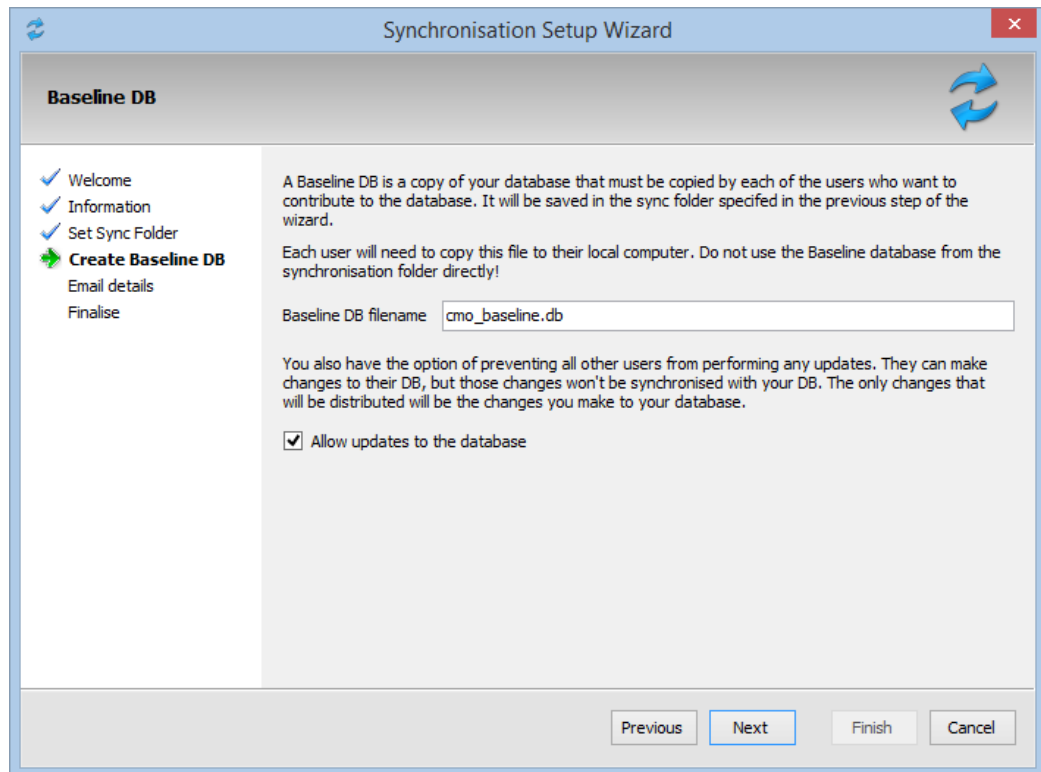
On this page we need to specify the DropBox folder where files will be synchronised to. Click on the button to open a folder selection dialog and navigate to the DropBox folder.



Click OK to select the folder.

The other option on this page of the wizard is to allow offline synchronisation. If you are using cloud-based storage this should always be off. The only time you should turn this on is if you will be using the synchronisation process on a local network where the computers don't have access to the internet.

Click "Next" to continue.



The next step in the process is to define the baseline database. The Baseline DB is the database file everyone will need to start with in order to sync changes with each other. It is, essentially, a copy of the master database at the time.

The setup wizard will create the Baseline DB in the sync folder specified in the previous step.

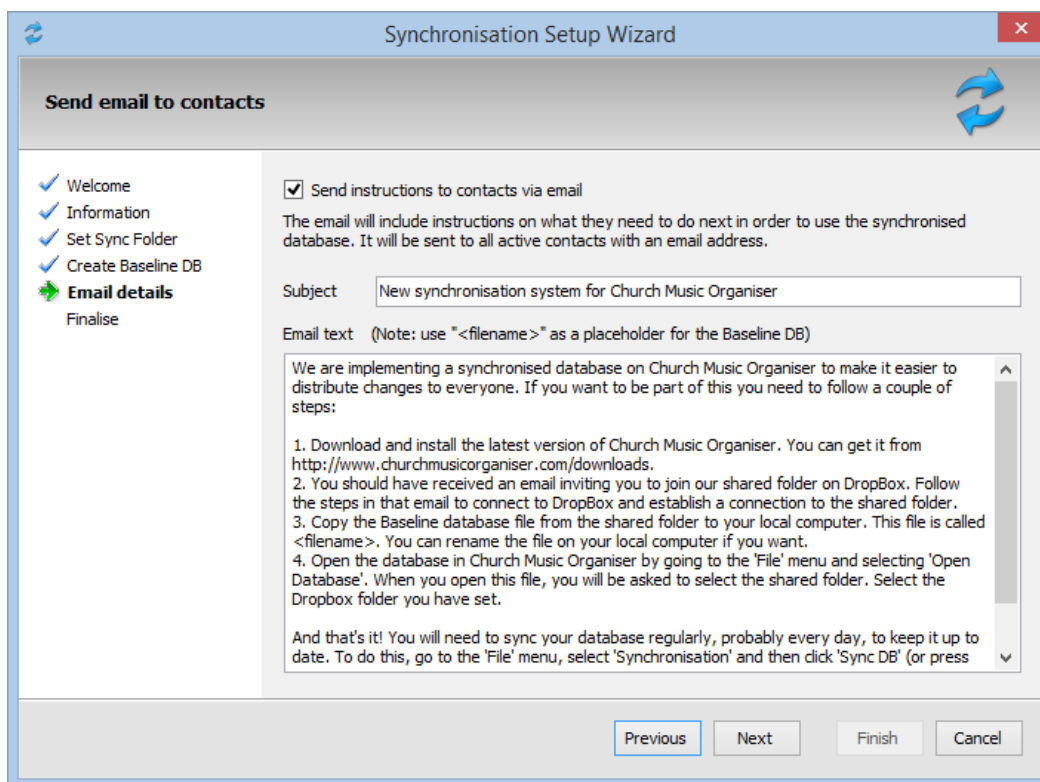
In order to use the Baseline DB, each user will need to copy the file from the sync folder on their computer to another location. **Do not attempt to use the Baseline DB from the sync folder!** Data may be lost if you attempt to do this.

The other setting on this page is "Allow updates to the database". If you want only want changes from your master computer to be sent out, and you don't want any changes from other computers coming back, then tick this box. Users still make changes on their computer but you won't see them on your computer.

Normally, though, you would allow updates from all computers.

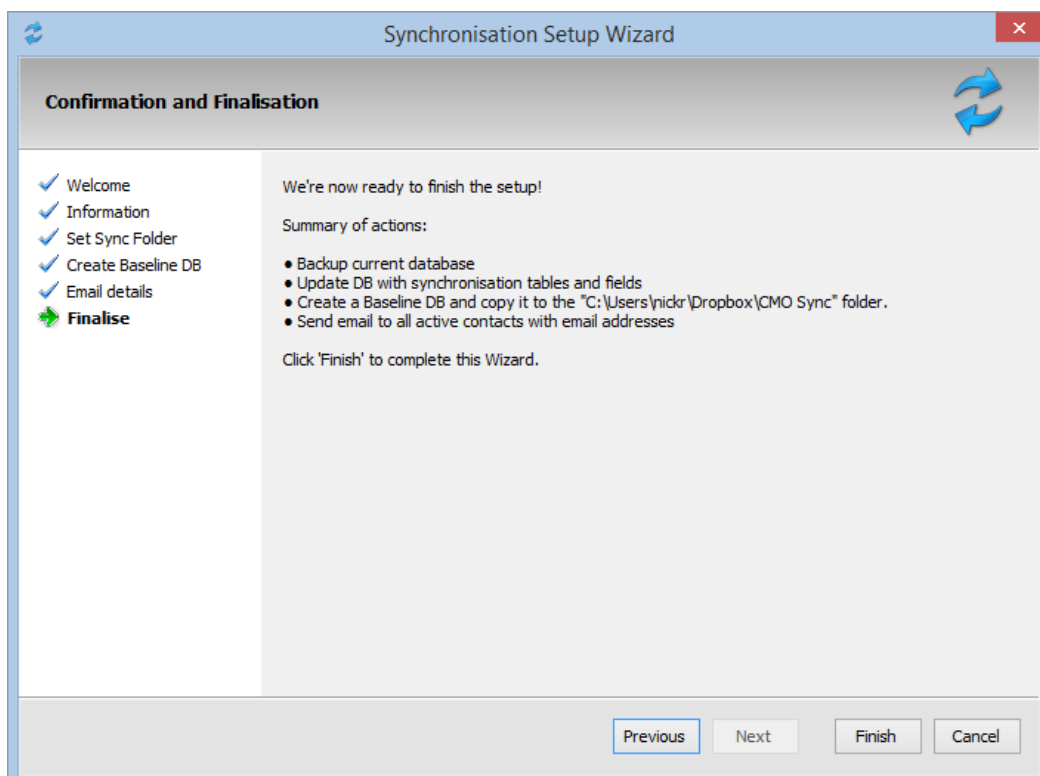
Click "Next" to continue.



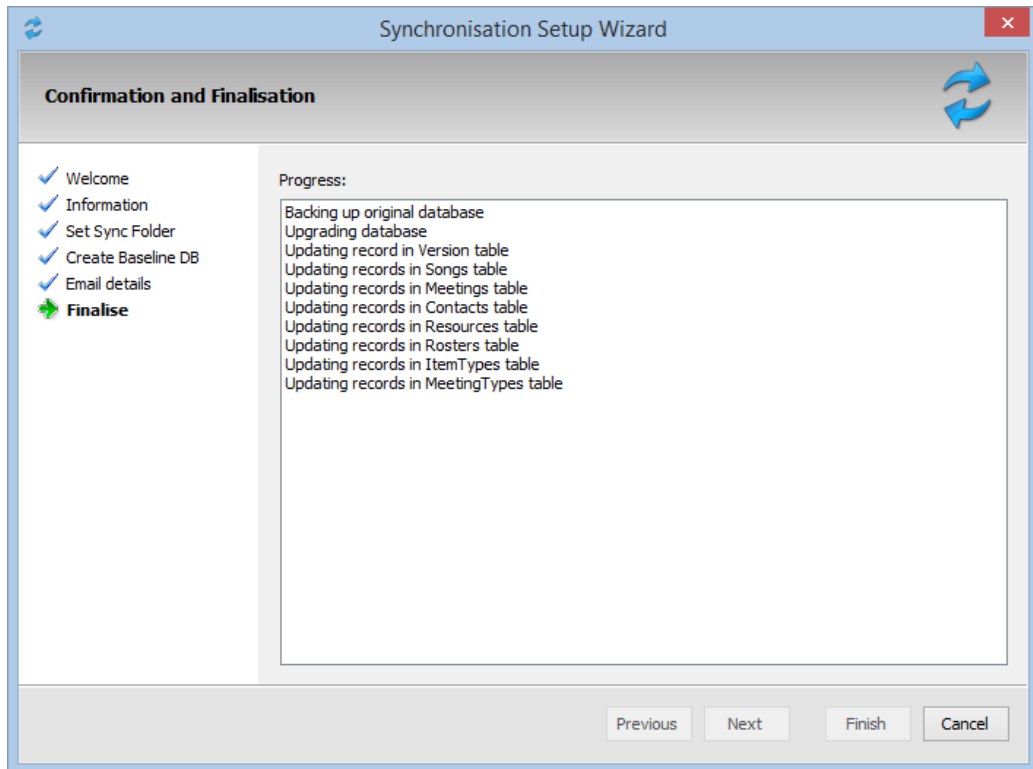


CMO can automatically send an email to all the contacts in your database who have an email address with instructions on how to get up and running. If you turn this on, a default subject line and email body has been provided, but you can make any changes you want to personalise it. The emailing process will take place during the finalise step.

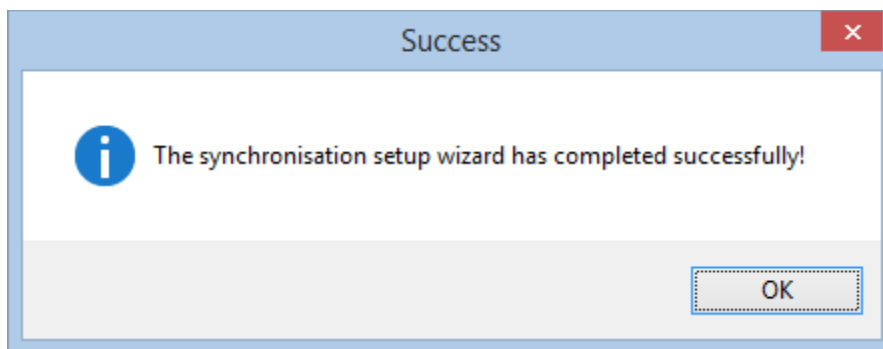
Click "Next" to continue.



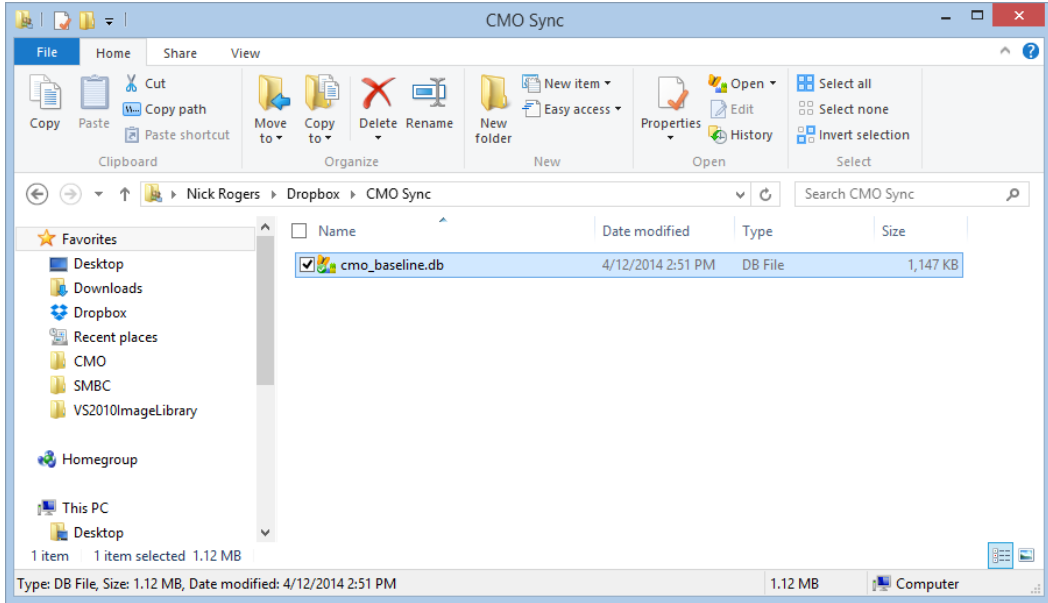
The final page of the wizard summarises all the things that will happen when the "Finish" button is pressed. If you want to make any changes you can click on the "Previous" button to go back to a page and adjust any setting you require. If everything is correct, click "Finish".



Your database will then be updated and when completed the following message will be displayed.

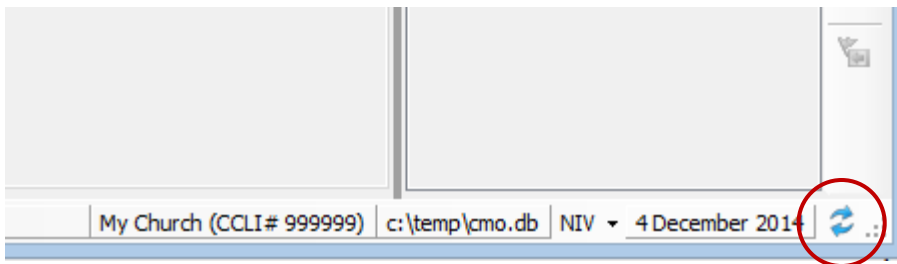


If we look in the DropBox folder we created, we can see the baseline database.



### Synchronisation process

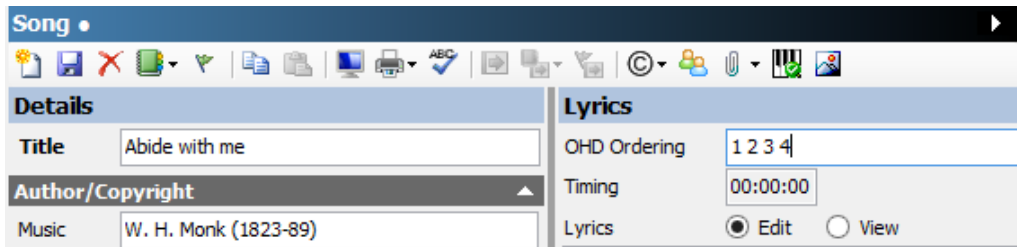
At this point, synchronisation is active. You can know when a database is set up for synchronisation by looking in the bottom right of the main screen.

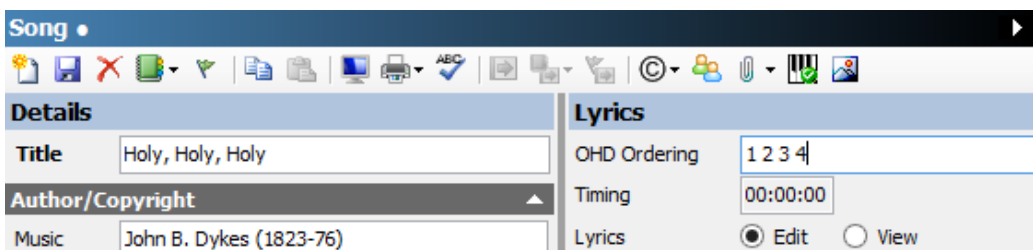
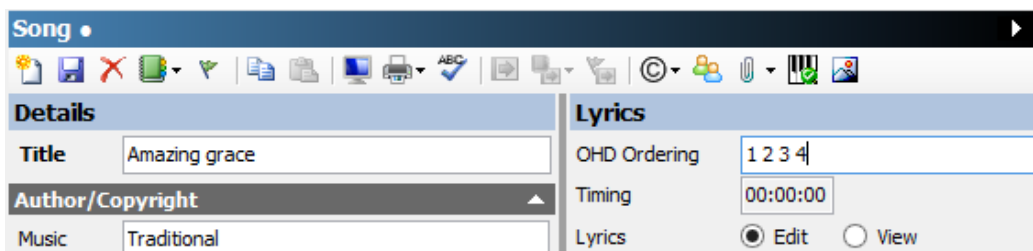


This icon indicates that this database is set for synchronisation.

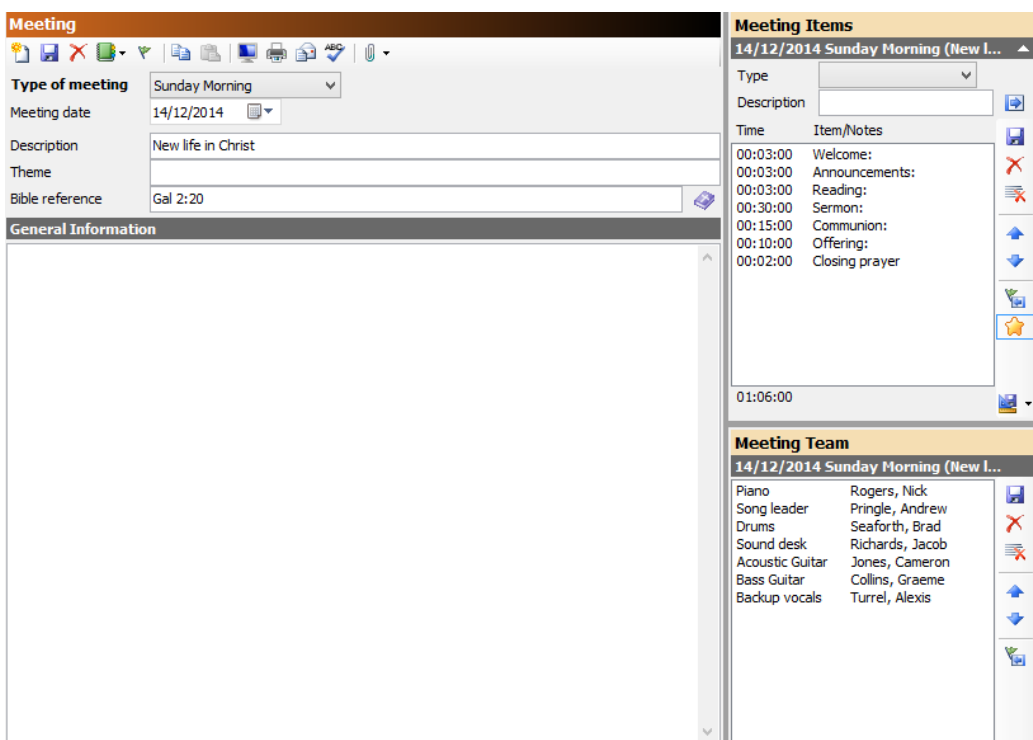
Any changes you make now will be flagged for syncing in the background. So let's make a few changes and see how the process works.

First, let's change a few songs by adding a verse order to them.





Let's also create a new meeting:



And finally, let's add a new contact:

**Contact**

First Name: Bob

Surname: Smith

Address: 15 Primary St

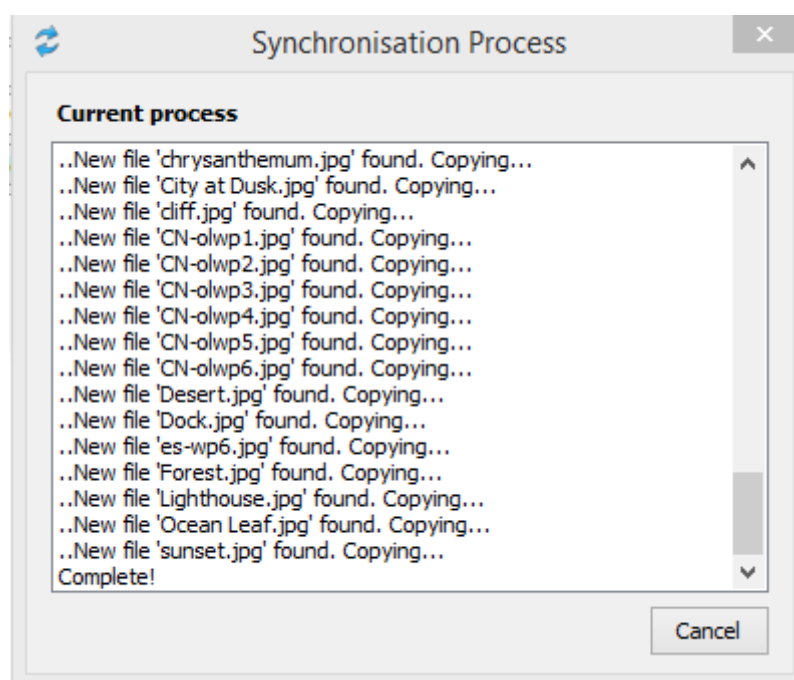
Sydney NSW 2000

Phone:  Mobile

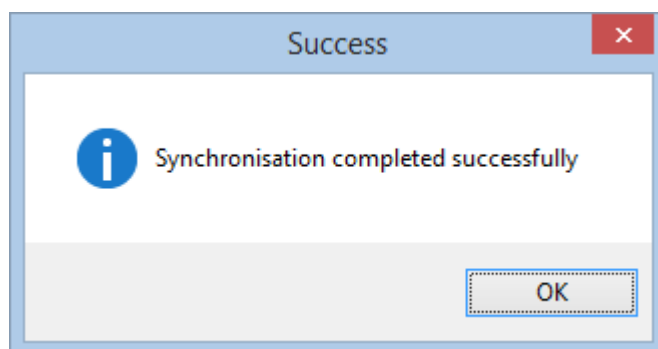
Email: bob.smith@email.com

Role: Song leader  Active

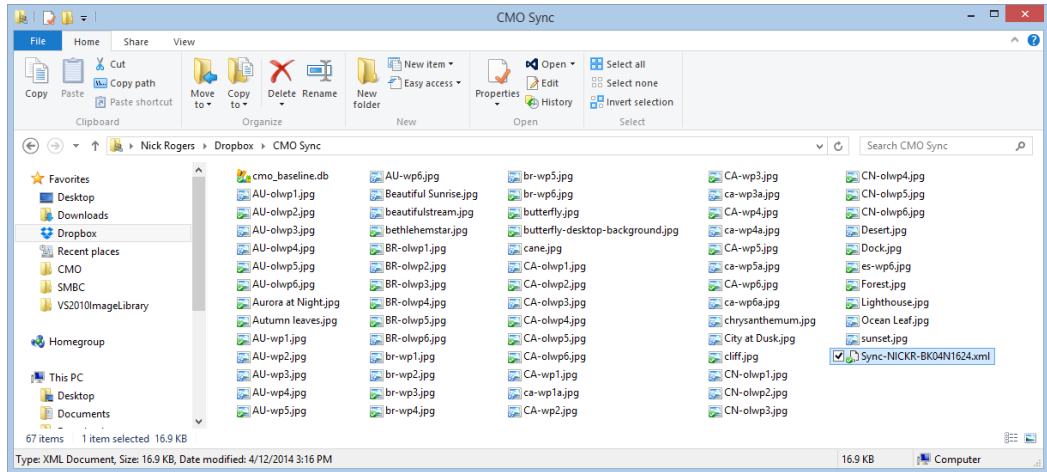
Now, to update all these changes, go to the "File → Synchronisation → Sync DB" menu, or press Ctrl+Shift+S, to start the sync process.



The sync process will create a sync file in the DropBox folder, as well as copying any image files currently stored in CMO. When complete you will see this message.

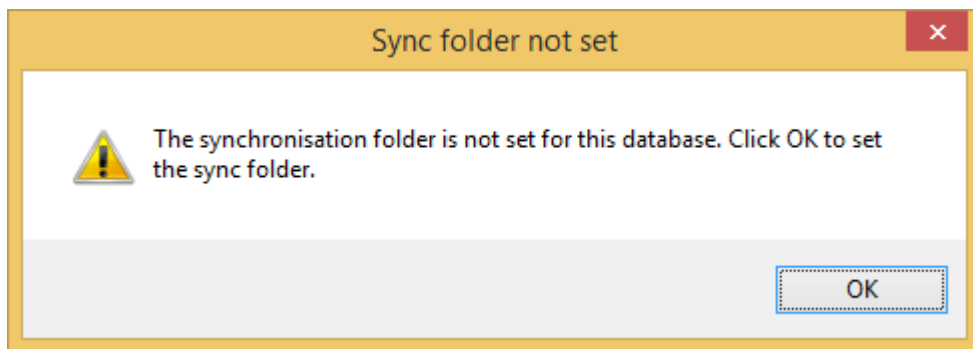


If we look in the sync folder now we see this.

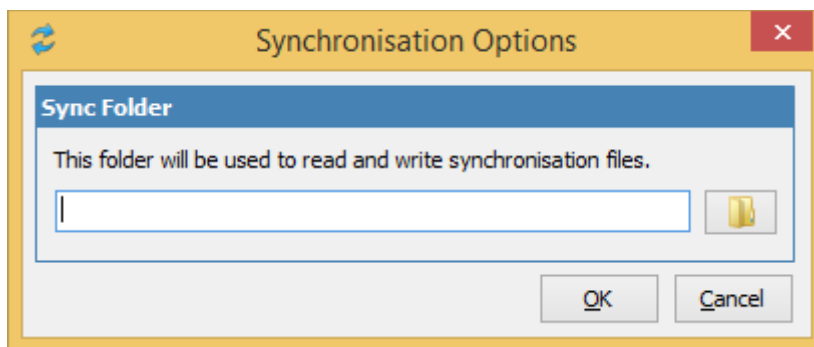


First, there is the baseline DB we saw before. Next, there are a series of image files from the CMO image folder. And finally, there is a single XML file. That XML file contains all the changes we just made on the database.

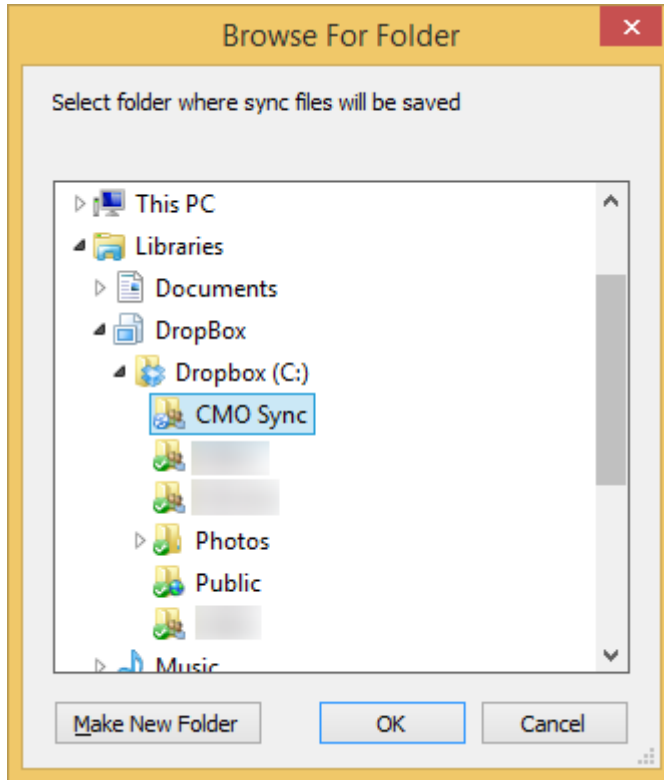
Let's go to another computer now, take a copy of the baseline DB, and open it up.



The first time you open the baseline DB you will be asked to set the sync folder. Click on OK to open the Sync Setting dialog.



Click on the folder button to open a folder selection dialog where the DropBox folder can be set.



Once this is set, the database is ready for use.

First, let's have a look at the data.

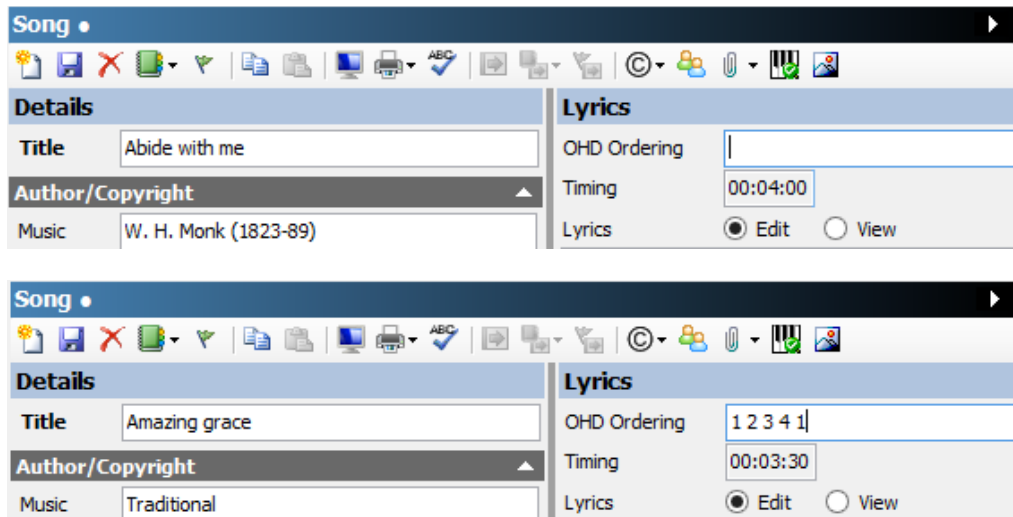
Meetings	
07/12/2014	Sunday Morning
07/12/2014	Sunday Evening
30/11/2014	Sunday Morning (God of Wonders)

We currently don't have the meeting for December 14.



And we don't have a contact record for Bob Smith.

Let's make some change to the records that were changed in the other database. In this case, let's add some timing values.



We've also added an verse order here that's different to the one in the other database.

Once we save these records we can go to the "File → Synchronisation → Sync DB" menu, or press Ctrl+Shift+S, to sync the DB.

The sync process will now read the sync file on the DropBox folder and attempt to apply the changes. However, it detects that we've made changes to the same records.



## Handling conflicts

### Synchronisation Conflict Resolution

**Changed record conflict**

A song has been changed locally and in the sync files.

Song		
Field	Local Data	Sync Data
CCLI Record	0	0
CCLI Project	0	0
CCLI Music	1	1
CCLI Reported	False	False
Themes	God - Grace God - Protection/Guidance Salvation/Redemption	God - Grace God - Protection/Guidance Salvation/Redemption
Grouping	Conference Youth ministry	Conference Youth ministry
OHD Sequence	1 2 3 4 1	1 2 3 4
Timing	00:03:30	00:00:00
Lyrics	Amazing grace, how sweet the sound That saved a wretch like me I once was lost, but now am found, Was blind, but now I see.  'Twas grace that taught My heart to fear, And grace my fears relieved. How precious did that grace appear The hour I first believed.  Through many dangers, toils and snares I have already come. 'Tis grace that brought me safe thus far And grace will lead me home.	Amazing grace, how sweet the sound That saved a wretch like me I once was lost, but now am found, Was blind, but now I see.  'Twas grace that taught My heart to fear, And grace my fears relieved. How precious did that grace appear The hour I first believed.  Through many dangers, toils and snares I have already come. 'Tis grace that brought me safe thus far And grace will lead me home.

**What do you want to do?**

Keep sync record, discard local changes

Keep local record, overwrite sync changes

Select fields to keep, and merge data

! Abort synchronisation process !

On this screen we can see both records side by side. There are a couple of options.

The first two buttons are self-explanatory: either keep the sync record or the local record. The third option, however, needs some further commentary.

All the fields that are the same in both records are shared in grey in the details section. The fields that are different are highlighted in white. You can click on the data you want to keep from each side. For instance, if you want to keep the timing value from the local record, and accept the verse order from the sync record, click on those two items.

**Synchronisation Conflict Resolution**

**Changed record conflict**

A song has been changed locally and in the sync files.

**Song**

Field	Local Data	Sync Data
CCLI Music	1	1
CCLI Reported	False	False
Themes	God - Grace God - Protection/Guidance Salvation/Redemption	God - Grace God - Protection/Guidance Salvation/Redemption
Grouping	Conference Youth ministry	Conference Youth ministry
OHD Sequence	1 2 3 4 1	1 2 3 4
Timing	00:03:30	00:00:00
Lyrics	Amazing grace, how sweet the sound That saved a wretch like me I once was lost, but now am found, Was blind, but now I see.  'Twas grace that taught My heart to fear, And grace my fears relieved. How precious did that grace appear The hour I first believed.  Through many dangers, toils and snares I have already come. 'Tis grace that brought me safe thus far And grace will lead me home.  When we've been there Ten thousand years	Amazing grace, how sweet the sound That saved a wretch like me I once was lost, but now am found, Was blind, but now I see.  'Twas grace that taught My heart to fear, And grace my fears relieved. How precious did that grace appear The hour I first believed.  Through many dangers, toils and snares I have already come. 'Tis grace that brought me safe thus far And grace will lead me home.  When we've been there Ten thousand years

**What do you want to do?**

Keep sync record, discard local changes

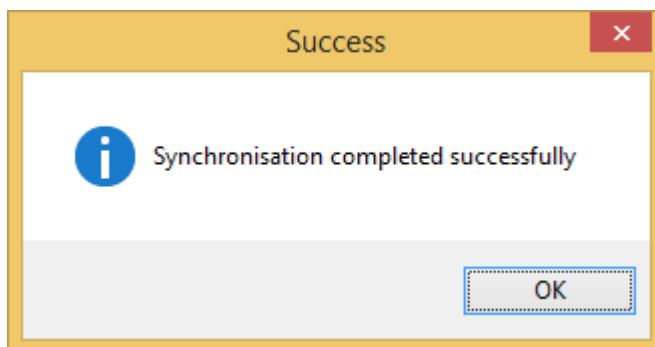
Keep local record, overwrite sync changes

Select fields to keep, and merge data

! Abort synchronisation process !

You would keep doing this for all the differences, until each one has a selection. Once completed, you can click on the "Select fields to keep, and merge data" button.

After doing this process for all the conflicts, eventually this message will appear.



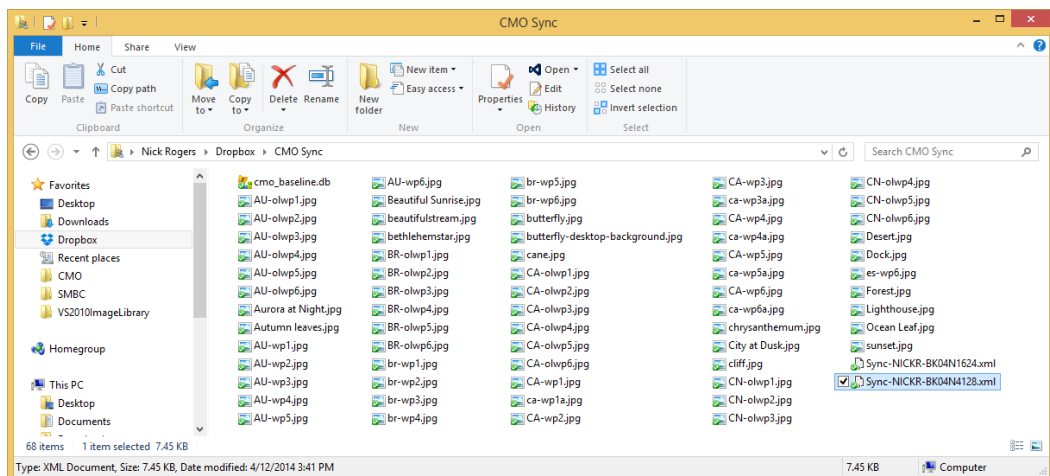
We can see the new meeting is now present.



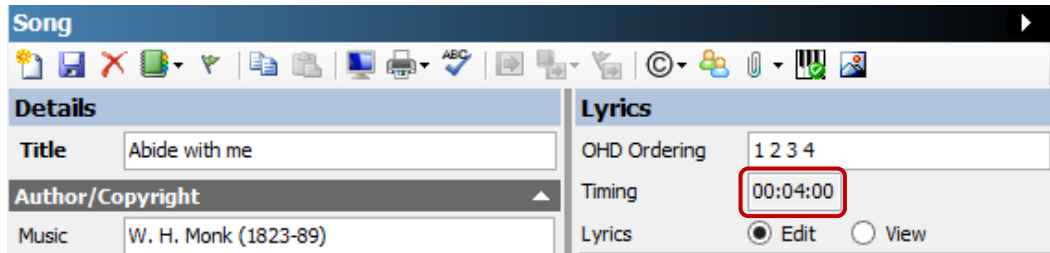
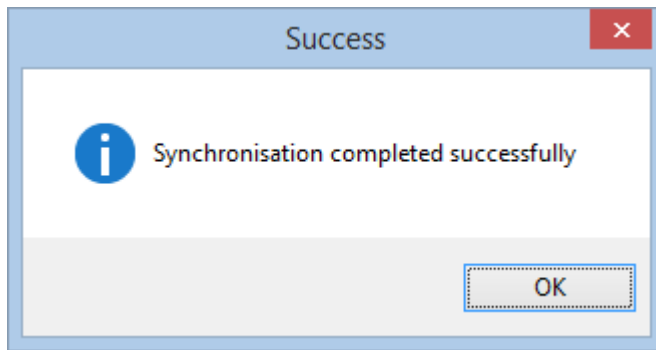
And the new contact.



If we look at the sync folder now, we will see a new sync file has been created.



If we switch back to our other computer and sync, the change we just made, to merge the verse order and timing values, will appear in the original database.



## Summary

In this chapter we've look at how to synchronise your CMO database across a number of computer in order to keep them all up to date, and the process of handling conflicts, where two people have updated the same record.