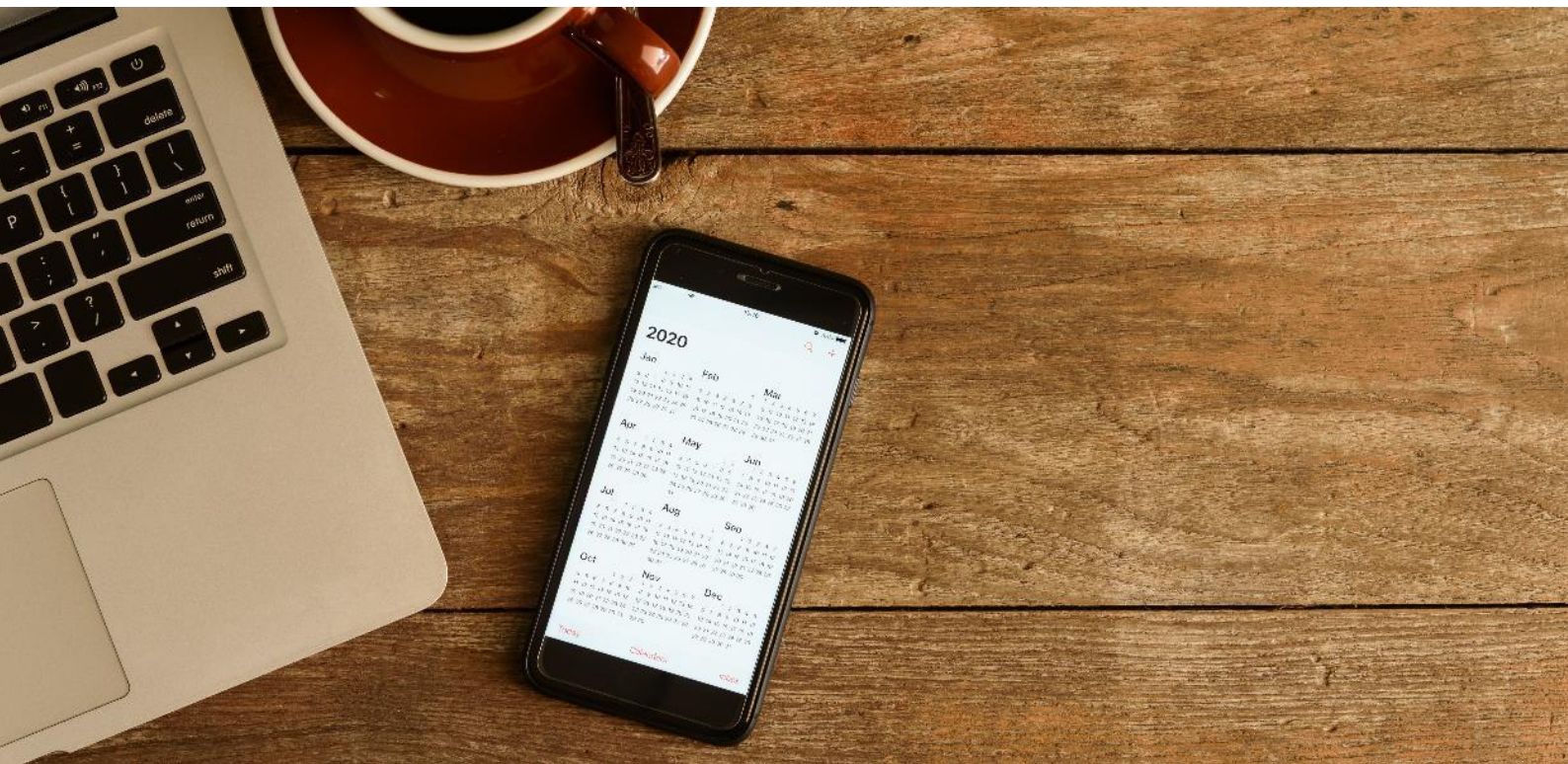


CalSync User Guide v1.21



Important Notice

S2 Unified Ltd. gives no warranty that all errors have been eliminated from this manual or from the software or programs to which it relates, and neither the Company nor any of its employees, contractors or agents, nor the authors of this manual, give any warranty or representation as to the fitness of such software or any such program for any particular purpose or use, nor shall they be liable for direct, indirect or consequential losses, damages, costs, expenses, claims or fee of any nature or kind resulting from deficiency, defect or error in this manual or such software or programs.

Furthermore, the user of the software and this manual is expected to become familiar with and master each step described in this manual before proceeding further.

The information in this document is subject to change without notice.

COPYRIGHT © 2020 S2 Unified Limited. All rights reserved. No part of this document may be reproduced in any form, including photocopying or transmission electronically to any computer, without prior written consent of S2 Unified.

Contents

CalSync.....	5
Introducing CalSync.....	6
Features	6
Supported platform	6
Server requirements.....	6
Infrastructure Requirements.....	7
Exchange	7
Active Directory	7
Timetable system	7
Understanding CalSync.....	8
Architecture	8
Terminology Overview.....	8
Installing CalSync	9
Preparation	9
Active Directory	9
Exchange/Office365	9
CalSync server	9
Installing CalSync.....	9
Installing the CalSync database	10
Connection string registry key.....	10
Configuring CalSync.....	11
Schedules.....	13
Timetable configuration.....	13
Start date/end date.....	13
Additional settings	13
Exchange configuration	14
EWS URL.....	14
Impersonation account.....	14
Password	14
Exchange version	15
Impersonation type.....	15
Directory configuration	16

Enabled	16
Domain	16
Search base	16
Timetable attribute.....	16
Mail attribute	16
Filter	16
DBLookup configuration.....	17
Enabled	17
Email address field.....	17
Timetable ID field.....	17
Filter	17
Table/view.....	17
Templates configuration.....	18
EWSBatch	20
Configuring access to the timetable database	22
CalSync snippets	22
Troubleshooting	23
Frequently asked questions.....	23
Logging	24
Advanced settings.....	25
Speed/timing	25
Use AuthName for email lookup	25
Merge rooms/lecturers from multiple lessons	25
Late appointments.....	25
List separator	26
Database timeouts.....	26
Getting support	27
Contacting S2 Unified.....	27

Changes & Revisions

Version	Changes	Date
1	Initial version.	02/01/2020

CalSync

This guide introduces the main topics of interest related to CalSync for administrators. The following chapters provide usage information and instructions for installation, configuration and maintenance.

Introducing CalSync

Features

- Single view of appointments and calendar
- Access anytime, anywhere
- Supports BYOD culture
- Enhances the student experience
- Promotes adoption of Office 365
- Helps to maximise student attendance

Supported platform

- Windows Server 2008 R2 or later
- SQL Server 2008 R2 or later

Server requirements

The application server requirements for CalSync are as follows:

- 2.4GHz x86_64 CPU or higher
- 8GB RAM
- 8GB disk space

The SQL database requirements are as follows:

- ~512 bytes per appointment. To calculate an estimate of the total database size, multiply 512 bytes * <no. of students> * <average number of lessons per student within the synchronised period>
- Latin1_General_CI_AS collation
- Simple recovery mode is recommended

Depending on the synchronisation period, the database can become large; given that SQL Express is limited to a maximum size of 10GB, Standard or Enterprise editions are recommended.

The application and SQL roles may coexist given adequate hardware.

Infrastructure Requirements

Exchange

For CalSync to synchronise appointments using Exchange Web Services, a dedicated service account must be created in the end system. This will require a user licence in the Exchange system. It may be necessary to create two accounts – one for students and one for lecturers – if the email systems are separate, for example, if staff email is held in Exchange on-premise and student email is in Office365 in a non-federated domain.

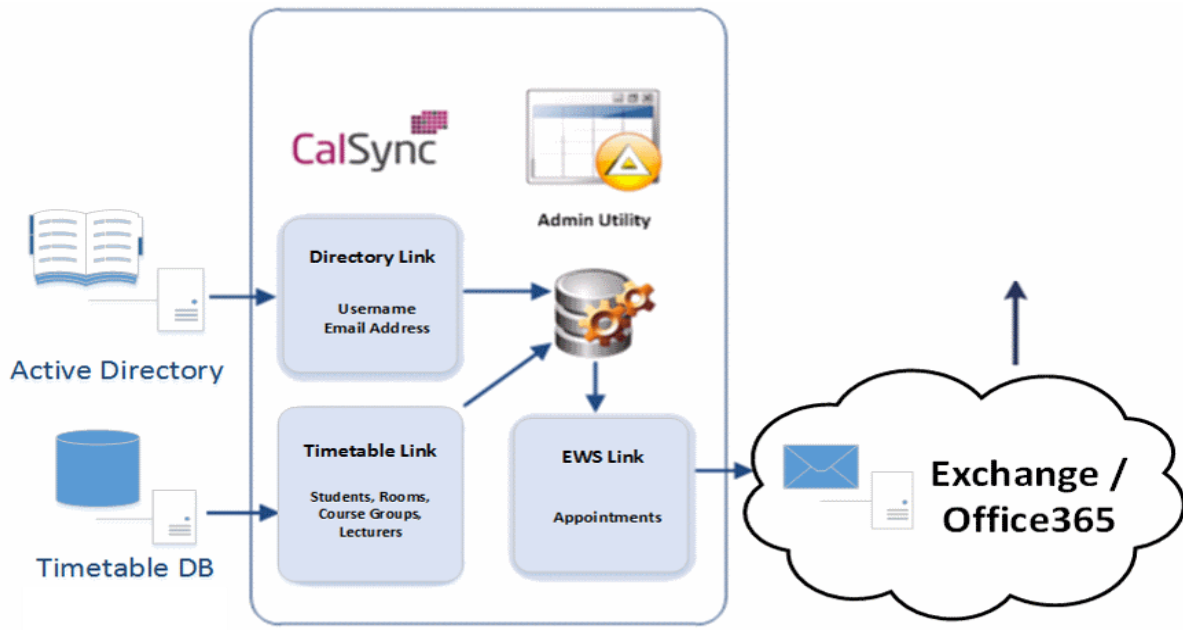
Active Directory

The CalSync directory link must be configured to run as a user that has read access to the email addresses of all students and lecturers in the directory. Typically, no changes are required if the server account can do this.

Timetable system

CalSync requires read-only access to the timetable system. This is typically achieved by direct SQL Server or Oracle database connection. Internally, CalSync uses the Microsoft-provided System.Data.SqlClient or Oracle.DataAccess.Client APIs.

Understanding CalSync Architecture



Terminology Overview

The following definitions explain the terminology used in this document.

- CalSync Admin Utility**
 The Windows application that can stop/start services, configure CalSync settings and manually refresh a student's calendar.
- CalSync database**
 The CalSync database maintains a standardised set of timetable information. This is always an SQL server database, regardless of the underlying database used by the timetable system.
- Directory/DBLookup link**
 These Windows services are used by CalSync to gather the email addresses of lecturers and students from Active Directory or another database.
- Scheduler link**
 The Windows service used by CalSync that updates the database with student, room, lecturer, lesson and course group information.
- EWSLink**
 The Windows service used by CalSync that updates the Exchange online account with appointments for each entry in the database.
- Course group**
 This is the grouping that CalSync uses to identify which students are attending each lesson. This may be a module, course or class group name, or some other identifier used in the timetable system.

Installing CalSync

Preparation

Active Directory

If the server computer account does not have read access to student email addresses, then create a new user account that has these rights. This account will need 'log on locally' and 'log on as a service' permissions on the CalSync server.

Exchange/Office365

Create a new user account and mailbox for the CalSync service account using the appropriate management tools. One account should be created for each connected Exchange system (for example, on-premise Exchange and Office365 for lecturers and students respectively).

Then, for each service account, execute the following command from a PowerShell session connected to the target Exchange system:

```
New-ManagementRoleAssignment -Name "Impersonation-CalSync" -  
Role "ApplicationImpersonation" -User <identity>
```

where <identity> should be replaced with the newly created service account.

To connect to an Office365 tenancy, first run the following commands:

```
$LiveCred = Get-Credential  
  
$Session = New-PSSession -ConfigurationName Microsoft.Exchange  
-ConnectionUri https://ps.outlook.com/powershell/ -Credential  
$LiveCred -Authentication Basic -AllowRedirection  
  
Import-PSSession $Session
```

You will be prompted to enter tenancy administrator account credentials. For more information, please see the [Working with application impersonation in Exchange Online](#) article on the Microsoft website.

CalSync server

1. Install Windows Server 2008 R2 or higher.
2. If Windows Server 2012 or higher, install .Net 3.5 Framework.
3. Install all available updates.
4. Join the machine to the user domain.

Installing CalSync

1. Insert or download the installation media and execute the Setup.exe file.

2. Click 'Next' on the 'Welcome to the CalSync Setup Wizard' screen.
3. Click 'Next' on the 'Confirm Installation' screen.
4. Click 'Finish' to complete the installation.

Installing the CalSync database

1. Install an SQL Server 2008 R2 or higher instance (if not using a central SQL server).
2. Using SQL Server Management Studio, create a new database on the SQL server called CalSyncDB.
3. Grant the Active Directory service account db_owner permissions to the CalSyncDB database.
4. Grant the server account (e.g. CALSYNC01\$) db_owner permissions to the CalSyncDB database.
5. Execute the CalSyncDB_Create.sql script from c:\Program Files (x86)\S2 Unified\CalSync.

Note: By default, CalSync expects to find a database named CalSyncDB on the local machine. If this is not the case, alter the connection string registry key as per the following example:

- Key location:
`HKEY_LOCAL_MACHINE\SOFTWARE\WOW6432Node\ProofID\CalSync\Database`
- Name:
`ConnectionString`
- Default value:
`Data Source=localhost;Initial Catalog=CalSyncDB;Integrated Security=SSPI;`

Where parameters are as follows:

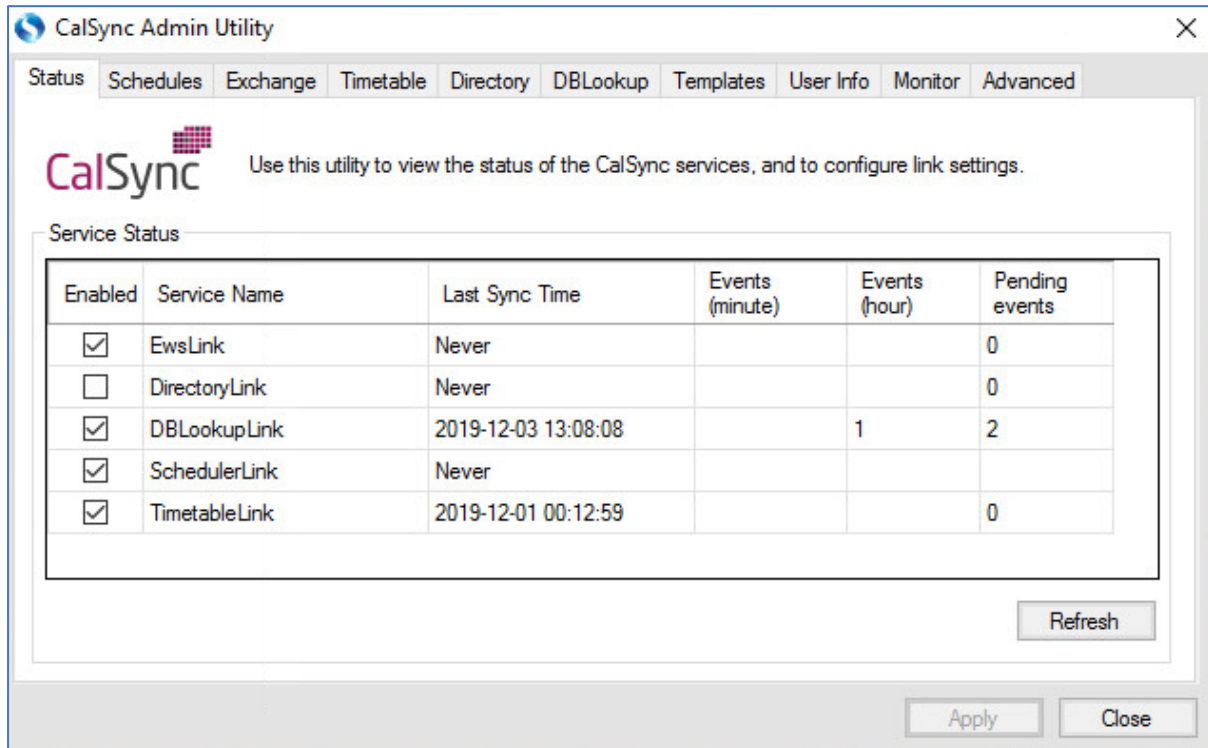
- Data Source
The hostname or IP address of the server that is hosting the CalSync database. If this is inside an instance, specify it as `hostname\instancename`
- Initial Catalog
The name of the database.
- Integrated Security
SSPI is the value to use when the user account that is running the services, and the application, can access the database.

Connection string registry key

For more information on an appropriate connection string for your database, please visit <http://www.connectionstrings.com>

Configuring CalSync

After the CalSync installation has completed, it must be configured to work against the target systems. Launch Admin Utility from Start -> All Programs -> S2 Unified -> CalSync Admin Utility on Server 2008R2, or from the start screen on Server 2012+.



This displays each of the links, how many events have been processed recently and how many are pending.

Events are:

- **EWSLink events**
Each create, update or delete operations in the calendar. This value may be significantly higher than the other events as a change to a room name, for example, could cause thousands of individual updates.
- **DirectoryLink events**
Each read of an AD user (one event per user, not attribute).
- **TimetableLink events**
Each update to courses, lecturers, rooms, lessons or groups.
- **DBLookupLink events**
Each read of a database user (one per user, not attribute).
- **SchedulerLink events**
Displayed so that it can be disabled/enabled only.

Initially, all of the services will be disabled; once configured, these can be enabled. On first install, we recommend starting the TimetableLink and DBLookupLink or DirectoryLinks to ensure that the data is imported correctly before starting the EWSLink.

The 'Refresh' button will update the event totals on this screen.

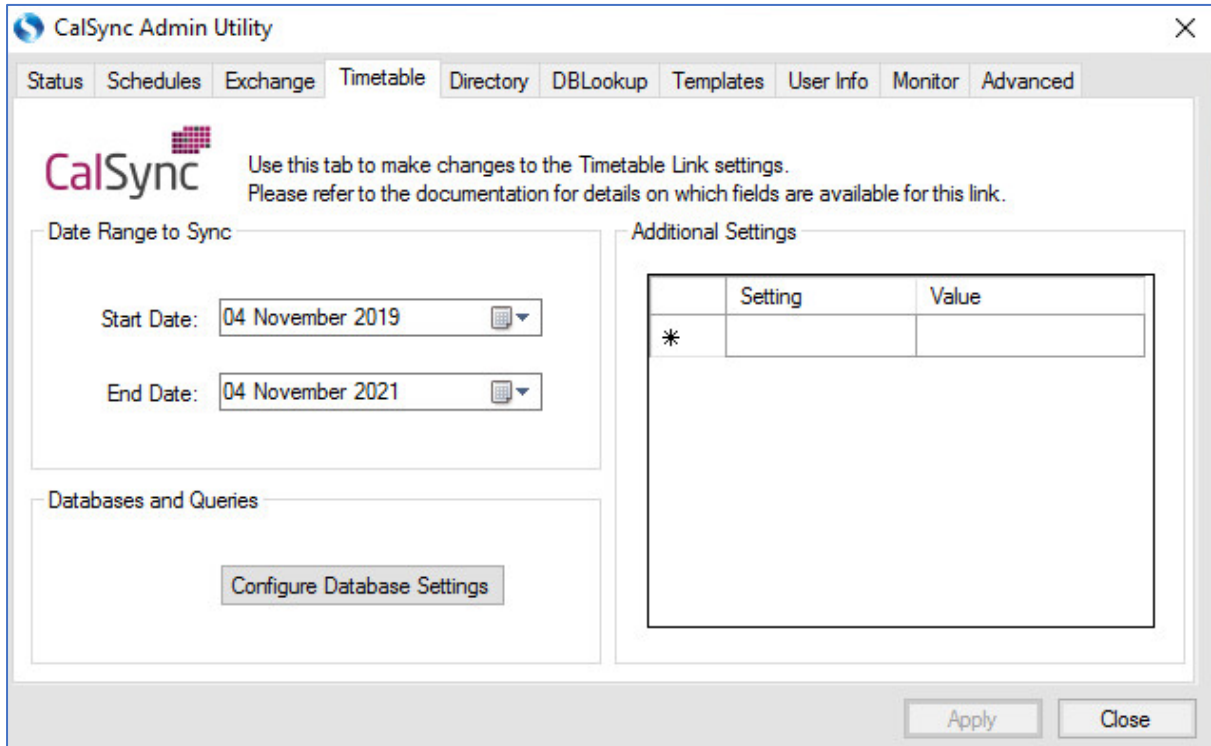
Whenever a change is made, ensure that the 'Apply' button is pressed to save these changes to the database. Changes will take effect the next time the service completes a cycle.

Schedules

Schedules can be added here. Each scheduled event executes one of the configured database queries. These schedules repeat every day at the specified time. It is possible to configure the schedule to repeat every few minutes throughout the day.

Timetable configuration

The timetable link settings will be preconfigured from the setup.sql file provided with the installation files, or will have been custom designed by your installation engineer.



CalSync Admin Utility

Use this tab to make changes to the Timetable Link settings.
Please refer to the documentation for details on which fields are available for this link.

Date Range to Sync

Start Date: 04 November 2019

End Date: 04 November 2021

Databases and Queries

Configure Database Settings

Additional Settings

	Setting	Value
*		

Apply Close

Start date/end date

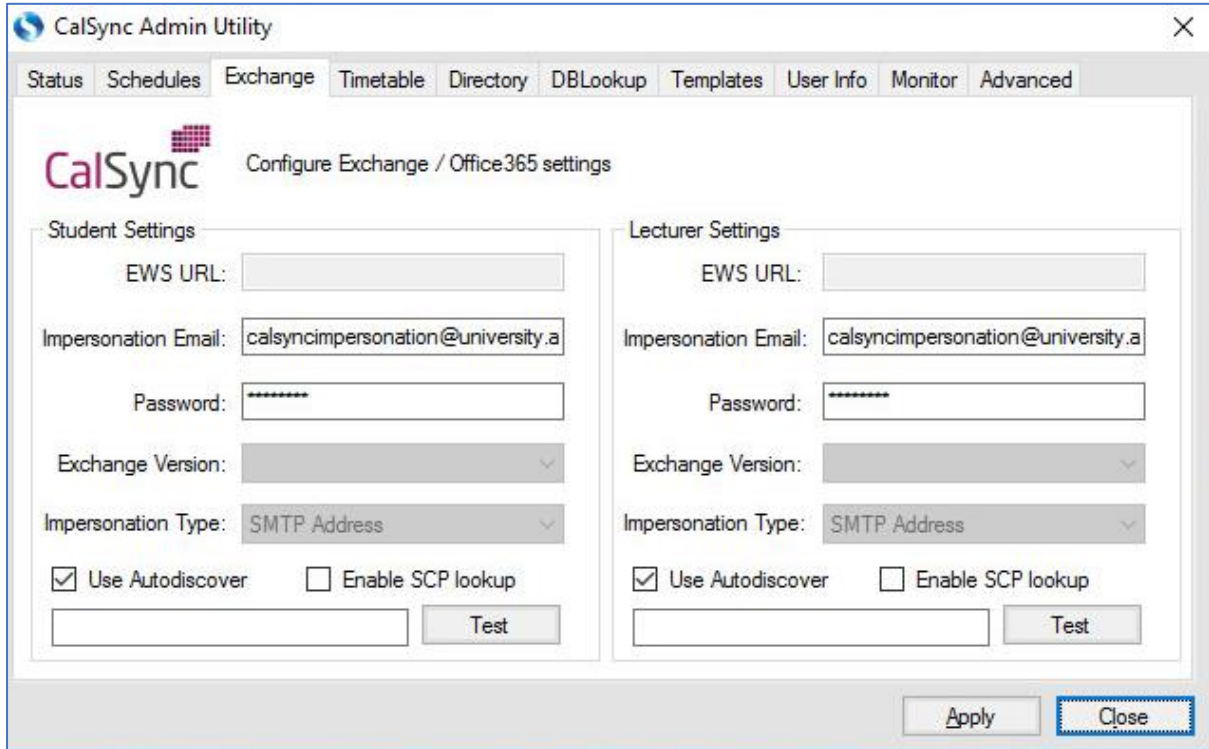
The date range of lessons to synchronise. It is recommended that this is initially set fairly conservatively, and standard practice is to only publish one semester of timetable at a time.

Additional settings

The settings here are replaced into the SQL snippets. They are commonly used to indicate which academic year in the timetable database should be synced, or which database is used to retrieve timetable information from.

Exchange configuration

The EWS link settings must be configured in line with the Exchange/Office365 environment(s). If lecturers and students share an Exchange system, then enter the same details in both sections of the form. If CalSync should not create appointments for students or lecturers, then leave that section empty.



The screenshot shows the 'CalSync Admin Utility' window with the 'Exchange' tab selected. The window is titled 'Configure Exchange / Office365 settings'. It contains two main sections: 'Student Settings' and 'Lecturer Settings'. Each section has fields for 'EWS URL', 'Impersonation Email' (pre-filled with 'calsyncimpersonation@university.a'), 'Password' (masked with asterisks), 'Exchange Version' (a dropdown menu), and 'Impersonation Type' (a dropdown menu set to 'SMTP Address'). Below these fields are checkboxes for 'Use Autodiscover' (checked) and 'Enable SCP lookup' (unchecked), followed by a 'Test' button. At the bottom right of the window are 'Apply' and 'Close' buttons.

For Exchange systems, it is possible to 'autodiscover' or manually configure the path to the Exchange Web Service. It is recommended to use Autodiscover for Exchange where possible, and hardcoded for Office365. However, if lecturers and students share the same namespace, it may be necessary to hardcode one or both of the systems. Enter the details of the impersonation accounts that were granted permissions earlier using PowerShell.

EWS URL

This is the Exchange Web Service URL. For example, if the domain is college.ac.uk, then the URL may be `https://mail.college.ac.uk/EWS/Exchange.asmx`. This is not set if Autodiscover is in use. For Office365, this value should be set to `https://outlook.office365.com/ews/Exchange.asmx`

Impersonation account

The UPN of the account assigned the *ApplicationImpersonation* role using PowerShell.

Password

The password for the above impersonation account.

Exchange version

The version of Exchange which is running on the domain. The list includes Exchange 2007 SP1, Exchange2010, Exchange 2010 SP1, Exchange2010 SP2, Exchange 2013 and Exchange 2013 SP1. This is not required if Autodiscover is in use.

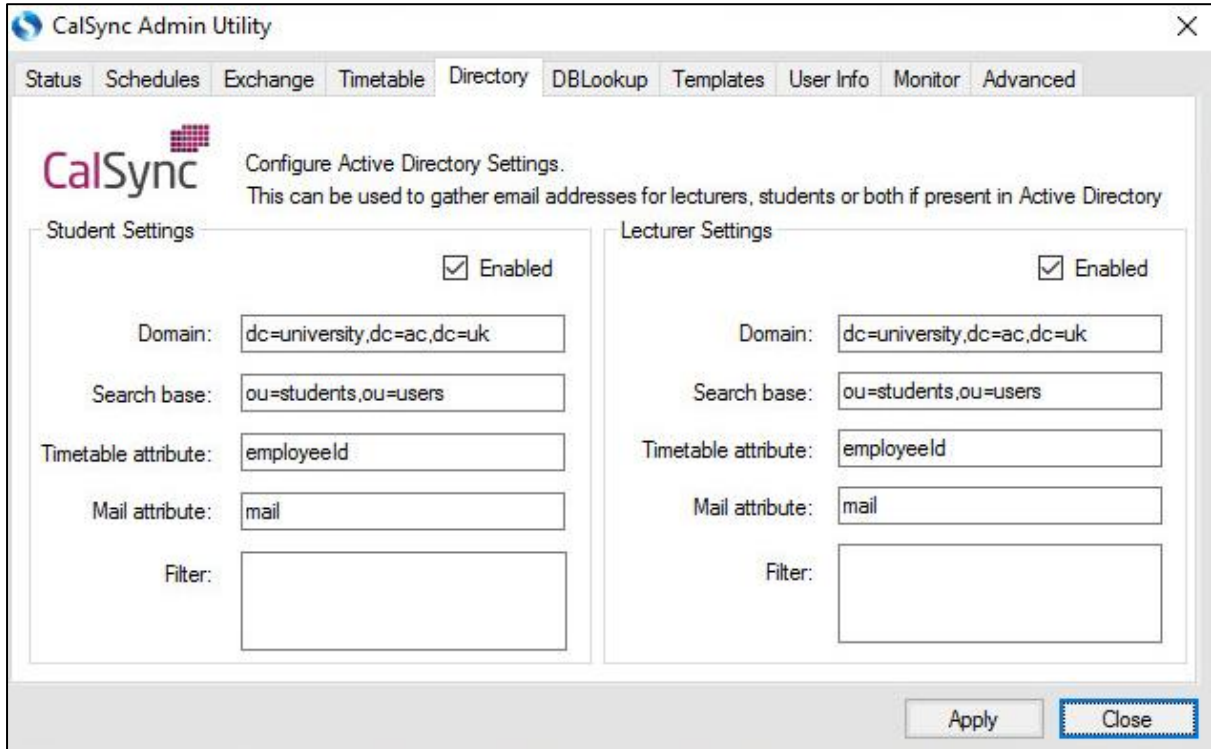
Impersonation type

Whether the students are identified by their SMTP address or their User Principal Name.

If Autodiscover is going to be used, enter a valid student or lecturer email address, and click 'Test' to ensure that CalSync can find the Exchange system. Please note that this may take 20-30 seconds the first time.

Directory configuration

The directory link settings must be configured in line with the Active Directory environment(s):



For each domain, enter the appropriate settings:

Enabled

If ticked, then the directory link will attempt to resolve user email addresses for this domain.

Domain

Active Directory domain in LDAP notation (dc=xxx,dc=yyy) format.

Search base

The LDAP search base for users (optional).

Timetable attribute

The Active Directory attribute that identifies the account in the timetable system. This is typically `sAMAccountName` if the username is the same in both systems.

Mail attribute

The attribute that holds the email address of the student.

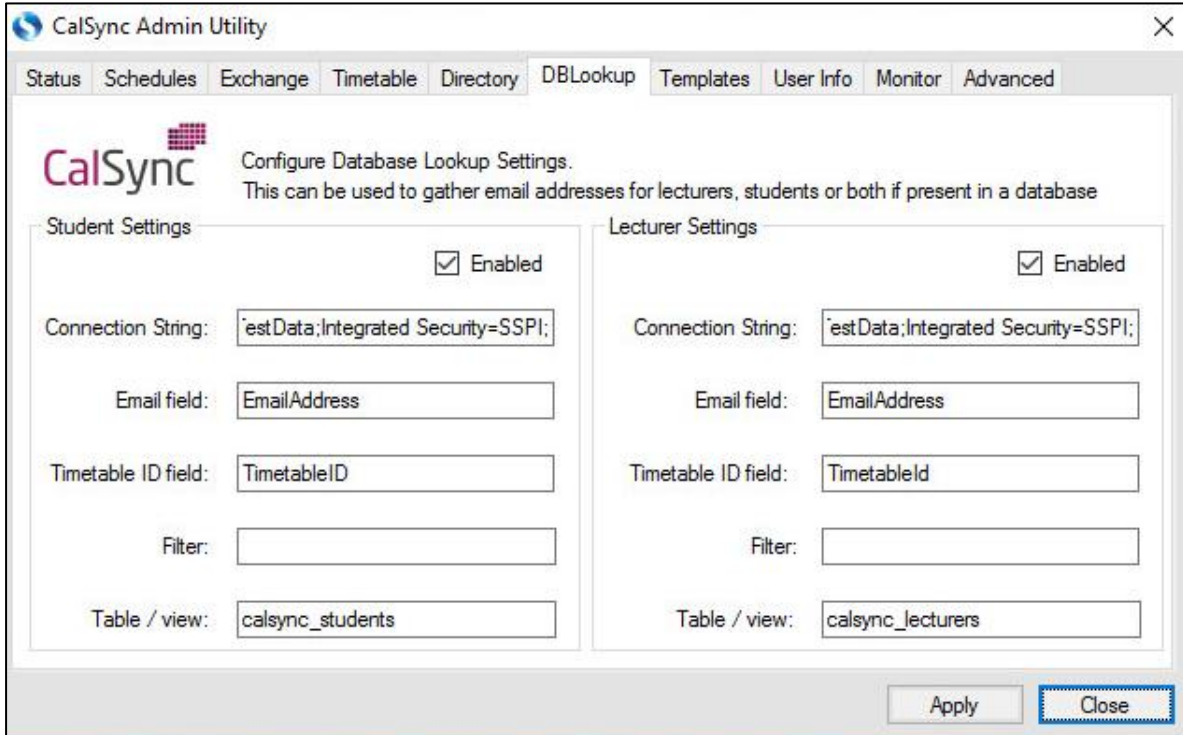
Filter

An LDAP filter to restrict the search (optional).

Note: It is not recommended to enable the same types of user on both the DirectoryLink and DBLookupLink.

DBLookup configuration

The DBLookup link settings allow CalSync to resolve user email addresses from an existing database:



For each type of user (lecturer/student), enter the appropriate settings:

Enabled

If ticked, then the DBlookup link will attempt to resolve user email addresses for this type of user connection string.

Email address field

The field in the database that holds the email address.

Timetable ID field

The field in the database that matches the unique identifier in the timetable database.

Filter

An optional SQL filter to limit results.

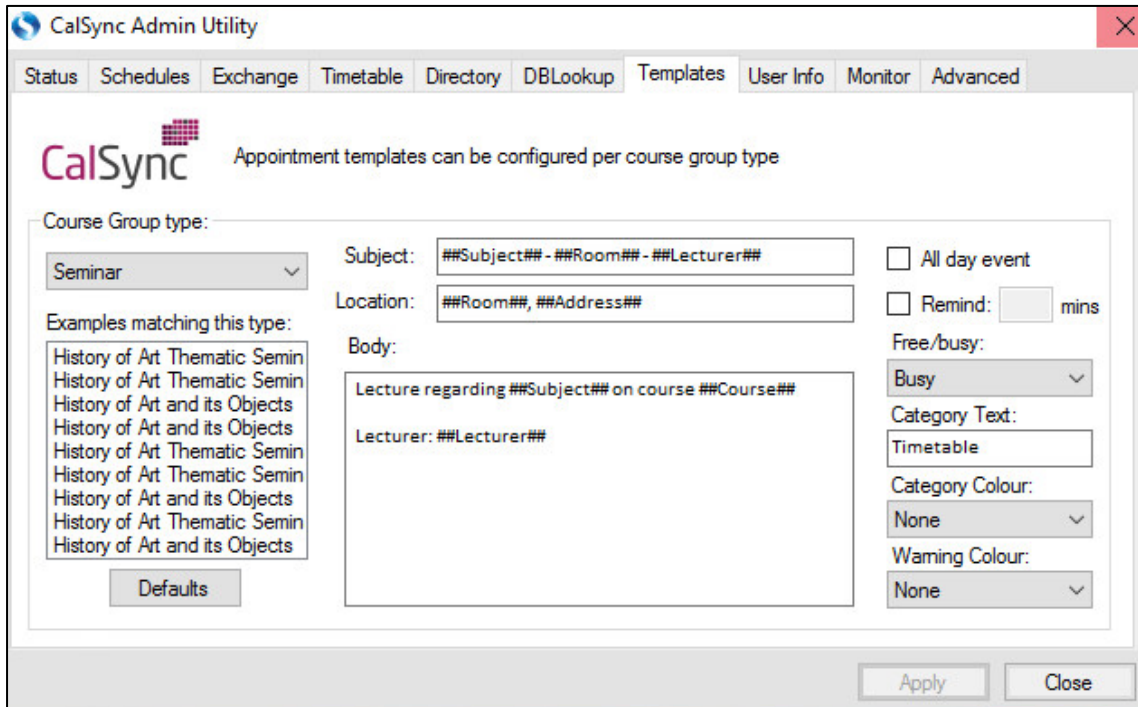
Table/view

The name of the table or view to search in the database.

It is not recommended to enable the same types of user on both the DirectoryLink and DBLookupLink.

Templates configuration

The way that the appointment is displayed can be configured for each course group type. There are at least two course group types – one for lecturers and one for students. There may be additional student course group types if there are multiple ways that students are associated to a lecture or if different types of events (e.g. practicals, study groups, lectures) must be identifiable. This is dependent on the type of timetable database in use and the individual institution's requirements.



The Subject, Location and Body fields can contain static text and details from the database. The Body field can contain basic HTML if desired. The following replacements are available:

Variable	Description
Subject	The subject of the lecture
Room	The name of the room where the lecture will take place
Lecturer	The name of the lecturer
Address	The address of the room (for example, which campus)
Course	The name of the course this lecture is about
Date	When the lesson starts
Created	When the lecture was created
Updated	When the lecture was last changed

Variable	Description
----------	-------------

SyncTime	When the appointment was last updated
----------	---------------------------------------

To include one of the replacements, enclose it in a pair of double # symbols. It is possible to add a 'category' to the appointment and choose a colour to display it. This functionality is only supported against Exchange 2010 or higher. A different colour can be used to highlight events that have changed up to a configured number of hours before the start of the event.

Note that you must restart the EWSLink service after making any changes to the templates.

EWSBatch

EWSBatch is a utility for performing bulk operations on a user mailbox. These operations are:

Operation	Description
view	Lists appointments created by CalSync
delete	Deletes appointments created by CalSync
deleteorphans	Deletes appointments that are not in the CalSync database
resync	Causes appointments to be deleted and recreated
deletedupes	Deletes appointments that are duplicated in the calendar

The 'view' and 'delete' operations can be executed even if the CalSync database is unavailable. In the event of a disaster, it is possible to clean up the calendars before reinstalling CalSync.

'deleteorphans', 'deletedupes' and 'resync' require access to the CalSync database and must be executed from the CalSync server. The resync operation also requires the EWS link to be running.

Run ewsbatch.exe from a command shell with the '--help' parameter to see a list of options and their descriptions:

```
Administrator: C:\Windows\system32\cmd.exe

C:\Program Files (x86)\S2 Unified Ltd\CalSync>EwsBatch.exe /?
CalSync EWS Batch Utility ewsbatch 1.0.21.0
Copyright © S2 Unified 2017

ERROR(S):
-u/--username required option is missing.
-m/--email required option is missing.

-o, --operation      (Default: view) Operation
                     (view|delete|deleteorphans|resync|deletedupes)

-u, --username      Required. EWS service account

-m, --email         Required. Email address to impersonate

-s, --server        (Default: autodiscover) EWS server

-p, --password      (Default: prompt) EWS service account password

-d, --definition    (Default: CalSyncID) Extended property to search for

-b, --batchsize     (Default: 100) Number of appointments to fetch in one go

-t, --trace         (Default: False) Show EWS trace output

-r, --range         (Default: 0) Days from now to process

-c, --scp           (Default: False) Enable SCP

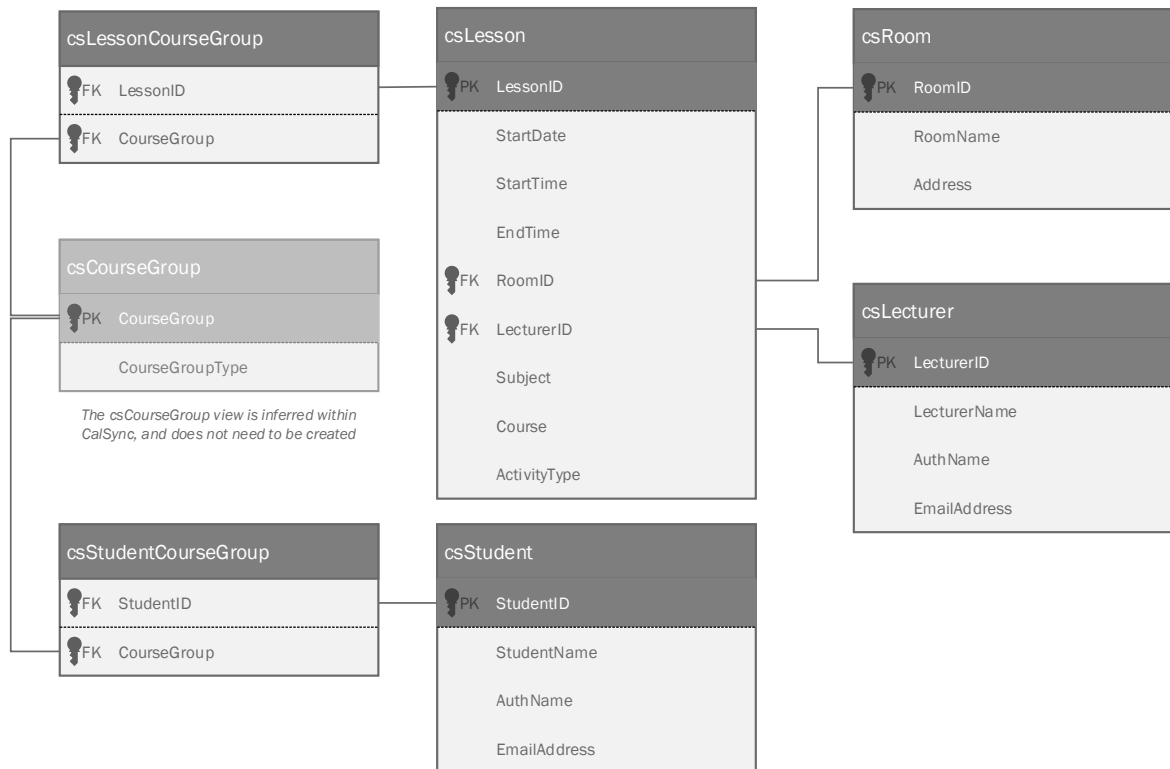
-i, --upn           (Default: False) Search by UPN rather than SMTP

--help             Display this help screen.
```

Configuring access to the timetable database

This activity is typically a joint effort with the S2 Unified professional services team and forms part of the installation.

In order to read the information from the timetable database, we use a series of SQL 'snippets'. These can reference CalSync specific views or can access the tables/views from the timetable system directly. The information that CalSync requires is shown in the following figure:



CalSync snippets

There is one snippet for each of: Lesson, Room, Lecturer and Student.

The LessonCourseGroup snippet defines the relationship between lessons and course groups, and likewise the StudentCourseGroup snippet defines the relationship between students and course groups.

The 'Index' of the LessonCourseGroup and StudentCourseGroup snippets defines which course group template is used. For example, you may wish to have a different template/colour for practical activities or exams than all other events.

By default, each of the snippets will be executed against the timetable database defined on the TimetableLink configuration in the Admin Utility. However, it is possible to override the connection string for one or more of the snippets, for example if student course membership is held in a Student Record System.

Troubleshooting

Frequently asked questions

A change has been made to the timetable, but it has not been reflected in the calendars

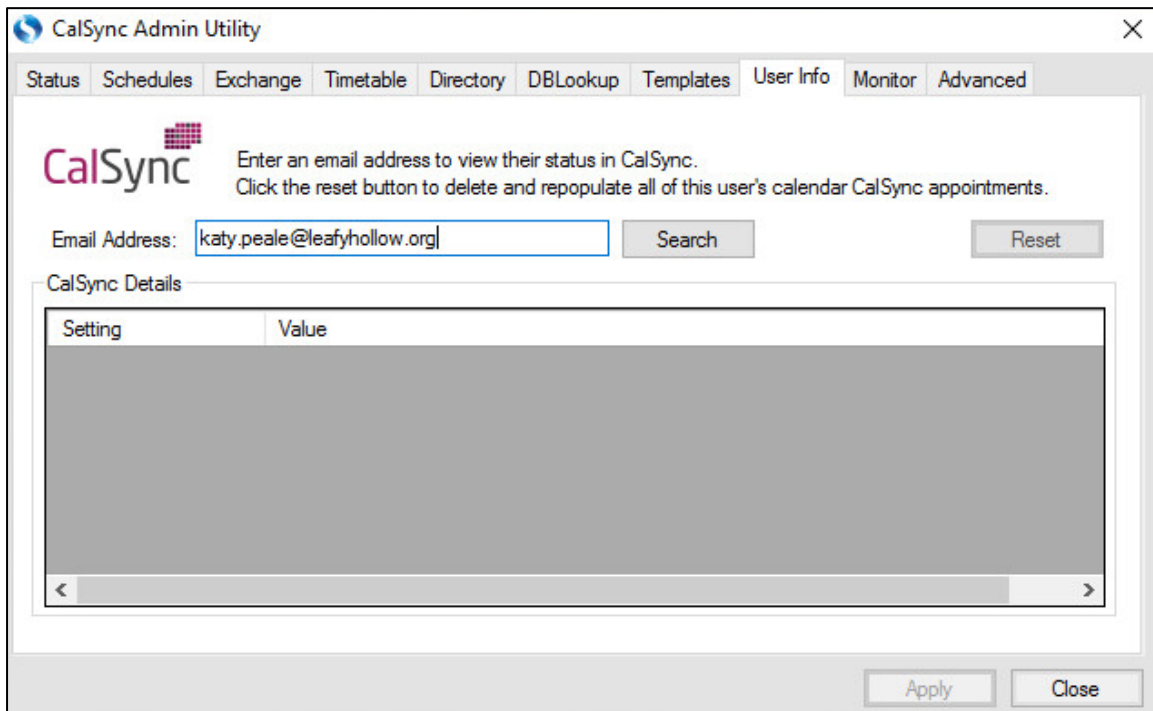
Before changes will be reflected in the calendars, the following criteria must be met:

1. The SchedulerLink must be running and have completed one complete cycle since the change.
2. The DirectoryLink or DBLookupLink must have populated the email address of the user. To check this, search for the user on the User Info tab.
3. Five minutes must have passed since the last change to this particular student/lesson/room/lecturer.
4. The EWSLink must be running.
5. In the case of an update to an existing appointment, the change will only be reflected in the calendar if it causes a change to the Subject, Location, Start Time or Duration. Changes to the body of the appointment will not take effect unless one of the other fields has changed.
6. The percentage of changes must be fewer than the limit dictated by the 'Confidence' value, set on the Advanced tab.

If all of these criteria are met, examine the log files for any errors and contact support if necessary.

A single user calendar is incorrect

CalSync cannot prevent users from making changes to their own calendars, so it is possible that it has been changed. To check this issue, see the 'User Info' screen in the Admin Utility (figure 5.1).



CalSync Admin Utility

Status Schedules Exchange Timetable Directory DBLookup Templates User Info Monitor Advanced

CalSync

Enter an email address to view their status in CalSync.
Click the reset button to delete and repopulate all of this user's calendar CalSync appointments.

Email Address: Search Reset

CalSync Details

Setting	Value

Apply Close

Firstly, enter the user's email address and click 'Search'. You can then check the details that CalSync has stored about the student. Check that the Course Groups setting matches what courses the student is taking. If the details seem correct, you can click 'Reset', which will delete and recreate all the appointments that CalSync has created for the user (this will not affect any appointments that the student has manually added or accepted).

Timetable maintenance/student fitting affects performance or causes SQL deadlocks

If you have a process that rebuilds the timetable database, or deletes and reinserts data at a particular time of day, we recommend that you do not run any schedules during this period.

Users in nested groups are not enabled by the Directory Link

If you are using an LDAP filter that references nested groups, change the syntax to:

```
(memberOf:1.2.840.113556.1.4.1941:=cn=group name,ou=ou,dc=ad,...)
```

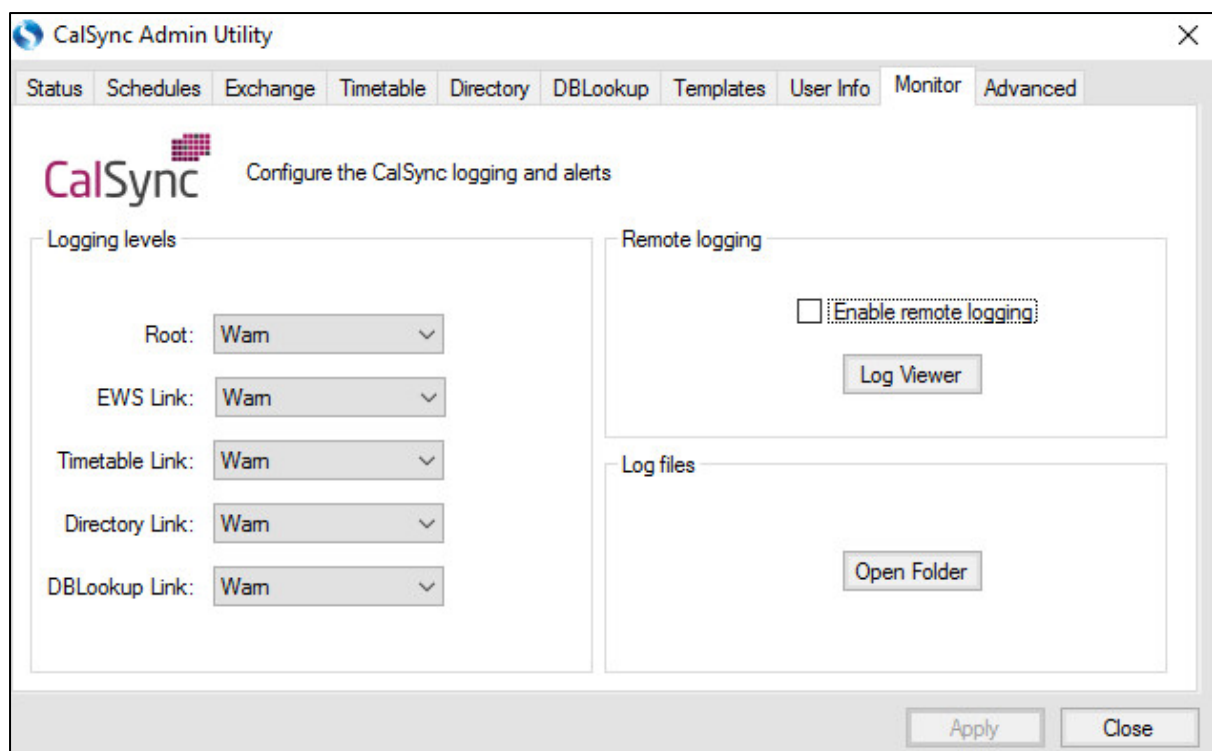
Appointment colours do not match those on the course group template

There are several causes of this:

1. The change has not yet synced into the email client.
2. There is more than one course group with the same Category Text.
3. The user has changed the colour of the category.

Logging

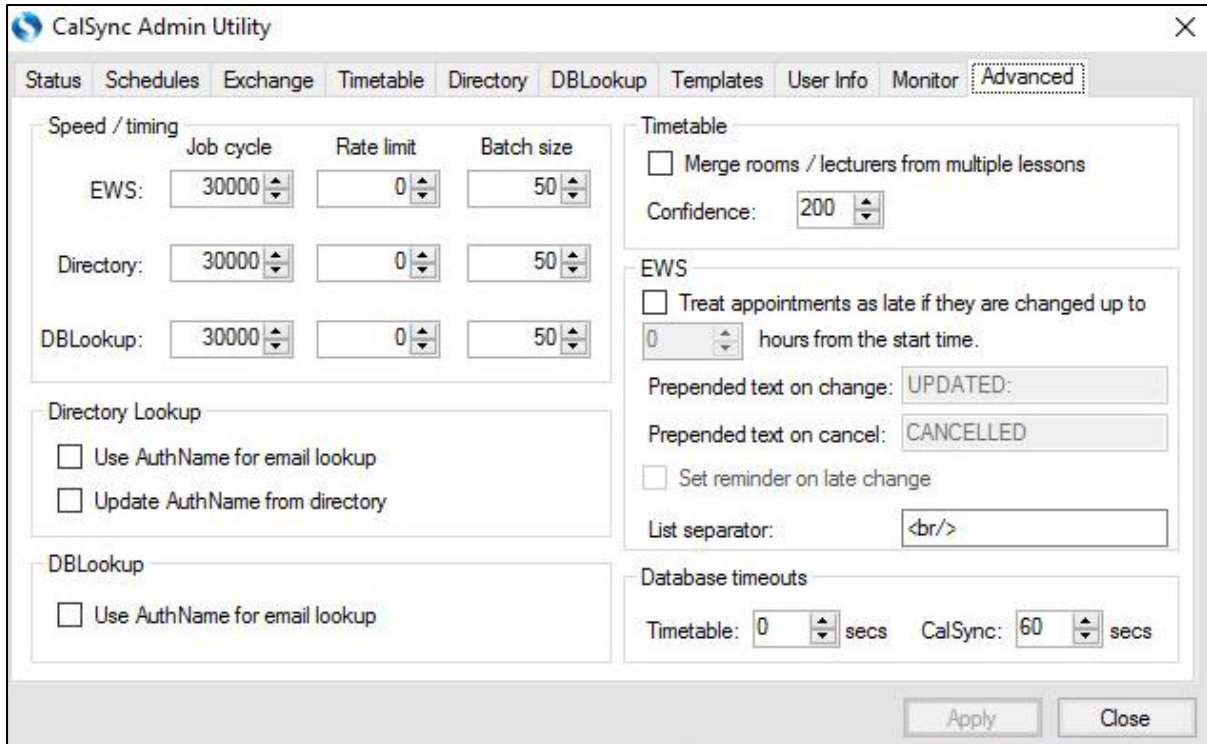
Logging can be enabled by changing the log levels on the monitoring tab (see figure 5.2).



Log files are accessed by clicking the 'Open Folder' button in the Admin Utility. Files will roll over once they reach 10MB and five historic files are kept for each service.

Advanced settings

The defaults supplied with CalSync are generally correct for day-to-day running. However, in some cases these may need to be changed.



Speed/timing

The speed/timing section controls how often and how quickly each service checks for events to process.

Use AuthName for email lookup

Indicates that the AuthName field for students and lecturers should be used rather than the student or lecturer ID.

Merge rooms/lecturers from multiple lessons

If the 'Lesson' snippet returns multiple rows for events that have multiple lecturers or rooms, then enable this option. Otherwise, it is assumed that the snippet returns a comma-separated list.

Late appointments

If an event is changed within the timeframe here, it will be updated and the category text prepended with the appropriate string. Once the event has passed, it will revert to the original category (if updated) or deleted (if cancelled).

If 'Set reminder on late change' is ticked, then late or cancelled appointments will have a reminder set to the current time. Users will typically receive a pop-up in the email client or mobile device to highlight the change.

List separator

This is the character used to separate room or lecturer lists in the appointment.

Database timeouts

These are the timeouts configured for the timetable and CalSync databases. If the SQL queries take longer than these timeouts to run, then they will be cancelled and postponed until the next poll cycle.

Getting support

Contacting S2 Unified

In the event that you experience an issue with the CalSync product, please log an incident with S2 Unified. Two named contacts are created in our support database after the initial installation has been completed.

To log an incident:

By telephone: +44 (0) 121 348 8984 (9am - 5pm, Monday to Friday)

By email: support@s2unified.com

Online: <http://www.s2unified.co.uk>

Please provide as much information as possible, including all available log files in a compressed (zip file) format.