Introduction to Timetabling and Facility CMIS

2011 Training Course
Contents

Introduction .................................................................................................................. 6
What is a timetable .................................................................................................... 6
Part 1 .......................................................................................................................... 8
The Facility CMIS software ...................................................................................... 8
The Facility CMIS suite ............................................................................................. 9
Facility CMIS ............................................................................................................. 9
Data tab ...................................................................................................................... 10
Interactive Scheduling ............................................................................................. 10
Room booking .......................................................................................................... 10
Facility Scheduler .................................................................................................... 11
Automatic Scheduling ............................................................................................. 12
Exam scheduling ....................................................................................................... 12
Student fitting .......................................................................................................... 12
myTimetable ............................................................................................................ 12
Calendars .................................................................................................................. 14
Part 2 .......................................................................................................................... 15
What is timetabling: viewing timetables in CMIS .................................................. 15
Timetables in Facility CMIS ..................................................................................... 16
The Timetable View ................................................................................................ 16
Master view timetables ........................................................................................... 18
Opening a timetable view ......................................................................................... 19
The Event window ..................................................................................................... 20
Part 3 .......................................................................................................................... 24
Filtering timetables, moving events, changing event times .................................... 24
Display the Filter button on the timetable ................................................................. 27
The Timetable filter .................................................................................................. 28
Changing the day/time of timetable events .............................................................. 33
Edit Event .................................................................................................................. 33
Changes via the timetable view ............................................................................... 34
CMIS Setting – modifying the timetable view ......................................................... 36
Time display .............................................................................................................. 36
Grid sizing ................................................................................................................................. 37
Cell resizing ............................................................................................................................... 38
Part 4 ........................................................................................................................................... 40
The List View ............................................................................................................................... 41
Configuring the List view ............................................................................................................ 42
  Column Labels ............................................................................................................................ 44
Filtering the List view ................................................................................................................ 45
Sorting list views ....................................................................................................................... 51
Default sort order ....................................................................................................................... 52
List of Illustrations

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Timetable Event</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>CMIS: VCP screen</td>
<td>9</td>
</tr>
<tr>
<td>3</td>
<td>Facility Scheduler: VCP</td>
<td>11</td>
</tr>
<tr>
<td>4</td>
<td>myTimetable - Homepage</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>Timetable view</td>
<td>16</td>
</tr>
<tr>
<td>6</td>
<td>Master view timetable</td>
<td>18</td>
</tr>
<tr>
<td>7</td>
<td>Opening timetable view via the menu</td>
<td>19</td>
</tr>
<tr>
<td>8</td>
<td>Opening a timetable via the icon</td>
<td>20</td>
</tr>
<tr>
<td>9</td>
<td>The Event Window</td>
<td>20</td>
</tr>
<tr>
<td>10</td>
<td>The Event window - requested equipment</td>
<td>22</td>
</tr>
<tr>
<td>11</td>
<td>Edit button - requested equipment</td>
<td>22</td>
</tr>
<tr>
<td>12</td>
<td>Event window - the event specification</td>
<td>23</td>
</tr>
<tr>
<td>13</td>
<td>Blank timetable view</td>
<td>25</td>
</tr>
<tr>
<td>14</td>
<td>Filtering the timetable</td>
<td>26</td>
</tr>
<tr>
<td>15</td>
<td>Timetable filter</td>
<td>26</td>
</tr>
<tr>
<td>16</td>
<td>Using a combined timetable filter</td>
<td>27</td>
</tr>
<tr>
<td>17</td>
<td>Timetable filter button</td>
<td>28</td>
</tr>
<tr>
<td>18</td>
<td>Timetable filter - Basic tab</td>
<td>28</td>
</tr>
<tr>
<td>19</td>
<td>Timetable filter - More tab</td>
<td>30</td>
</tr>
<tr>
<td>20</td>
<td>Timetable filter - Student tab</td>
<td>31</td>
</tr>
<tr>
<td>21</td>
<td>Timetable filter - Programme tab</td>
<td>31</td>
</tr>
<tr>
<td>22</td>
<td>Editing day, time and duration</td>
<td>34</td>
</tr>
<tr>
<td>23</td>
<td>Drag and drop event to new day/time</td>
<td>34</td>
</tr>
<tr>
<td>24</td>
<td>Modifying event duration</td>
<td>35</td>
</tr>
<tr>
<td>25</td>
<td>Configuration settings</td>
<td>36</td>
</tr>
<tr>
<td>26</td>
<td>Configuration settings - display event duration</td>
<td>37</td>
</tr>
<tr>
<td>27</td>
<td>Configuration settings - Grid size</td>
<td>38</td>
</tr>
<tr>
<td>28</td>
<td>Configuration settings - Cell resizing</td>
<td>39</td>
</tr>
<tr>
<td>29</td>
<td>The List view</td>
<td>41</td>
</tr>
<tr>
<td>30</td>
<td>Configuring the List View</td>
<td>42</td>
</tr>
<tr>
<td>31</td>
<td>Modify columns window</td>
<td>43</td>
</tr>
<tr>
<td>32</td>
<td>Adding a label</td>
<td>44</td>
</tr>
<tr>
<td>33</td>
<td>Column label</td>
<td>44</td>
</tr>
<tr>
<td>34</td>
<td>Filtering a list view: simple method</td>
<td>45</td>
</tr>
<tr>
<td>35</td>
<td>Filtered list view</td>
<td>46</td>
</tr>
<tr>
<td>36</td>
<td>Checking the current filter</td>
<td>47</td>
</tr>
<tr>
<td>37</td>
<td>Edit filter</td>
<td>48</td>
</tr>
<tr>
<td>38</td>
<td>Combined filter in list view</td>
<td>49</td>
</tr>
<tr>
<td>39</td>
<td>Other filter operators</td>
<td>49</td>
</tr>
<tr>
<td>40</td>
<td>Sorting columns in a list view</td>
<td>51</td>
</tr>
<tr>
<td>41</td>
<td>Default sort</td>
<td>52</td>
</tr>
</tbody>
</table>
Figure 42 - Applying default sort .......................................................... 53
Figure 43 - Changing the sort-order .................................................... 53
Introduction
The aim of this course is to give an overview of the timetabling process and the Facility CMIS software which the University uses to produce its timetables. The course aims to give a broad introduction to the software – further courses will explore different parts of the software in greater depth than will be covered here.

What is a timetable
Timetables come in many forms and are used in many areas of life, for example, train and bus timetables, staffing rotas and academic timetables used in schools, colleges and universities. Although they may have different forms, all timetables have much in common in that they all represent a method by which various resources are brought together and used at a given time and place.

The resources used in constructing and education timetable will include:

- Staff – lecturers, teachers or assistants
- Rooms – including the equipment available in those rooms
- Programmes (Courses) – which a student is registered on
- Units (Modules) – the elements or subjects which make up courses
- Equipment – required for teaching to take place
- Students – either attached to a Programme or Unit (or part of)

A timetable ensures that the correct resources come together in a suitable location at the same time and that those resources are not used in two places at the same time i.e. that they do not clash.

A timetable is put together according to a wide range or ‘rules’ which determine when and how different resources may be used. At its simplest such rules include the weeks, days and times that may be used, or the modules (units) that must be studied to follow a particular course (programme).
Introducing Timetabling & Facility CMIS

In Facility CMIS resources are brought together in an ‘Event’ and events are then scheduled (given a day and time) in order to produce a timetable free of clashes between those resources. The role of the timetabler is to manage the use of those resources and to collect together the rules that will determine how the resources are to be scheduled.

Timetabling software (Facility CMIS is used at Sheffield University) allows the University to manage the planning and creation of a timetable and to provide accurate and timely information to staff and students and to identify where there are potential problems within the timetable. This means that problems can be resolved more quickly and that the University can make more efficient use of its resources.
Introducing Timetabling & Facility CMIS

Part 1

The Facility CMIS software

In this section you will learn

- An overview of Facility CMIS
- An overview of Facility Scheduler
- An overview of MyTimetable
- Timetable Calendars
The Facility CMIS suite

Facility CMIS is a commercially available software system for the development of timetables and is used in Schools, Colleges and Universities. The software has three different elements

- Facility CMIS
- Facility Scheduler
- Facility Eportal (Mytimetable at Sheffield University)

Facility CMIS

Facility CMIS is the main element of the software package and is connected to a database which hold the University's timetable information. As it is connected to a database, any changes that are made via CMIS are live and are changing the actual timetable for staff and students.

The CMIS software, once opened, presents the following screen.

![Figure 2 - CMIS: VCP screen](image)

There are a number of important pieces of information displayed on this screen:

- Data source – this tells the user which database they are connected to
- Connected – tells the user whether the connection is active
- Validated – tells the user whether the database has been validated (not required for most users)
Introducing Timetabling & Facility CMIS

- Selected dataset – tells the user which dataset (academic year) they are connected to

The window also has three tabs

- Data
- Interactive Scheduling
- Room Booking

**Data tab**
The data tab has five different groups of icons

- Physical – information about buildings, rooms and equipment
- Academic – information about modules, programmes and programme structures
- Students – information about students and the modules/programmes to which they are registered
- Staff – information about lecturing staff
- Miscellaneous – other key information such as week ranges

The icons on this tab allow the user to check key data within the timetable, for example, to see that a module is available to be scheduled in the current academic year. Some data can be entered or modified via this screen.

**Interactive Scheduling**
The interactive scheduling tab has four different groups of icons, arranged in a logical order for the processing of information in order to build a timetable. The icons here, broadly speaking, relate to the various rules and restrictions that can be applied to the construction of a timetable. The icon groups are:

- Data – event rules (specifications provide a variable timeframe for scheduling) and resource restrictions such as staff availability can be defined here
- Curriculum – timetabling rules such as the order in which a module is to be delivered can be defined here
- Interactive – allows timetable validation (clash checking) and timetable viewing
- Output – timetable printouts and reports can be accessed here

**Room booking**
The room booking tab is used when making ad hoc bookings, for example meetings or bookings for external groups. Here icons are arranged in three groups:

- Data – information about contacts (including non-teaching staff) & organisations
- Bookings – making new bookings
- Costs – allows bookings to be charged
Facility Scheduler
The Facility Scheduler looks very similar to CMIS but operates in one very important way; when using Scheduler the user is working ‘offline’ and is not connected to the live database. This means that the user can often work more quickly than when connected to the live database, but that any changes they make are not reflected until data is ‘reintegrated’ back into CMIS.

Scheduler can also be used for ‘modelling’ timetables and running ‘what-if’ scenarios to allow for potential changes to the timetable such as increased student numbers, or the loss of rooms; such modelling may or may not be reintegrated into the live database.

Facility Scheduler also has a number of functions available to it, which are not part of CMIS. Those functions are:

- Automatic scheduling
- Exam scheduling
- Student fitting

Scheduler too, like CMIS, has a visual control path with three tabs for the different functions available.

Figure 3 - Facility Scheduler: VCP
Automatic Scheduling
As this suggests, Facility Scheduler is able to automatically schedule a timetable (or part of) using the scheduling rules referred to above. It can only do this if the timetable has no ‘in-built’ clashes, for example that a member of staff is not already scheduled elsewhere.

Automatic scheduling can mean a number of things:

- Giving events a day & time
- Also allocating staff
- Also allocating rooms

Exam scheduling
Exam scheduling means creating a timetable for examinations, again using the various scheduling rules available in CMIS, for example, exams that must be scheduled concurrently, or in a given order.

In addition there are two further functions that Scheduler can perform:

- Seating – allocating students to particular seats within an examination
- Invigilation – allocating invigilators to the examination timetable

Examination scheduling can be simpler that general scheduling because there is often only one event to be scheduled for an exam where general scheduling will include a number of different events such as Lectures, Practicals and Seminars.

Student fitting
This function allows the user to automatically allocate students to sub-groups of a module or programme. For example, if a module is delivered by means of a lecture, four practicals and eight seminars, then the student fitting function will allocate each student to one of the practical groups and one of the seminar groups. This then will allow us to create a personal (clash-free) timetable for each student, which can be published electronically to a student calendar.

myTimetable
Facility Eportal (badged as myTimetable at Sheffield) provides a method of allowing staff to view timetables via a web-browser (this method is not currently made available to students).

mytimetable allows staff to view timetables themselves and for other staff (students, modules, programmes and rooms timetables are also available but not currently enabled).
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The myTimetable home page has five different elements:

- **Timetable** – shows the users' timetable for today
- **MyRegisters** – shows the users' registers for today
- **Room Bookings** – shows the users' (ad hoc) room bookings for today
- **Timetables** – allows the user to search for other Lecturers' timetables
- **MyUnits** – shows which modules the user is attached to

Other functions, such as online room booking, are also available via myTimetable which we hope to enable in the coming months.

Other users may also be able to use myTimetable, such as students or external organisations who book rooms in the University but there are no intentions to use these functions at present.
Calendars
At present student timetable information is provided electronically to a calendar via MUSE and to mobile devices via CampusM.

The University intends to provide this information to a students' GoogleCalendar, but there is currently a problem within Google which means that the timetable calendars do not always refresh correctly. CiCS is currently investigating other means to provide this data to GoogleCalendar and may, in the longer-term, also seek to provide such information to staff calendars.
Part 2

What is timetabling: viewing timetables in CMIS

In this section you will learn:

- Presenting timetable information in Facility CMIS
- Interpreting information in a timetable view
Timetables in Facility CMIS

The Timetable View
CMIS allows a timetabler to present a finished timetable in a number of different ways – graphically, as a list e.g. a spreadsheet, or via the web. A typical graphical timetable is illustrated below.

![Figure 5 - Timetable view](image)

This simple graphical representation of a scheduled events shows days of the week on the left hand axis and times of day along the top axis.

Along the top of the window is shown Filter information which identifies which particular filter has been used – in this example we are looking at module INF104 from the Information School.

Within the timetable window there are a number of blocks (Cells) which contain information about the events that are taking place at particular times. Here the cells are displaying:

- Weeks that the event is scheduled - in green text
- Module code, group number and activity type
- Room
- Contact details - name, phone and email

The CMIS user can customise the timetable view and the cells used within a view, to display information which is most useful to them.
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Master view timetables
The master view timetable differs from the simple graphical representation described above in that the day and time are combined along a single axis. Along the other axis the data to display is chosen by the user, for example a number of rooms as shown below.

![Figure 6 - Master view timetable](image)

Here you can see that the two lecture theatres in the Alfred Denny Building are displayed and you can see that both Monday are Tuesday are shown together – using the scroll bars on the window will allow the user to look at other days for these two rooms (note – in this example the timetable is filtered to week 1 only).

You can also see that a different cell style is used here which shows:

- Module – code, activity and group
- Room – with a yellow background
- Lecturer
- Weeks booked – with a white background
- Contact details - name and phone
Opening a timetable view

A timetable window can be accessed via the menus along the top of the CMIS window (Timetable) – a list of saved timetable views can be seen at the bottom of the sub-menu list.

In the first section of the sub-menu there are options to create new timetable views and to edit those that have already been created.

A timetable window can be also accessed by using the timetables icon found on the second tab (Interactive Scheduling) on the Visual Control Path.
The Event window

Although the timetable window can present very detailed information about an event, this can make the window very crowded and difficult to read. More often the timetable window is used to present only a summary of the timetable.

The full details of a window can be found by opening the Event Window which is done by double-clicking on any event in the timetable view. Here the lecture event scheduled for module INF104 has been opened.

Here we can see further information about the event including:

- The unique event ID number
- The date and time of the last change made to the event
- The size of the event – 40
- Day – Monday
- Start time – 10:00
- Duration (in minutes) – 60
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- Weeks – 1-12 (semester 1)
- Source – Course (indicates that this is a teaching event)
- Owner – the Department which owns the event

In the central part of the window details of which resources are attached to this event are displayed.

- Module code, owner and activity – INF104 (Dept INF) - LECT
- Room allocated – RC-204: room category – DEPT (Departmental): room type – LT (lecture theatre)
- Room requested type – SR (seminar room)

You can also see that other information can be added to the event e.g. Staff or Equipment.

Please note that as each header in the window is selected in turn, that the bottom section of the event window changes to display the relevant data, and to allow data entry and modifications to be made which may be done by using the various buttons to the right hand side of the event window.
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Figure 10 - The Event window - requested equipment

Please note that when the fields Room, Requested room, Equipment, Features and Event specification are selected an additional Edit button is displayed on the right hand side. This allows the user to select additional information, for example below we can see that a request for a room with a Data Projector is being made.

Figure 11 - Edit button - requested equipment
Finally here we can see that this event is using an Event specification (General 1 hr – exl Wed pm) which is used by CMIS to indicate the time frame within which the event can be scheduled. In this example the specification means that the event can be potentially scheduled anytime on Monday, Tuesday, Thursday and Friday with start times between 9:00 and 16:00, and Wednesday between 9:00 and 12:00, with the start times spaced 60 minutes apart.
Part 3

Filtering timetables, moving events, changing event times

In this section you will learn

- How to apply a filter to a timetable view
- Changing a timetable filter
- Applying a compound timetable filter
- How to move an event to a different day
- Changing the duration (length) of an event
When a timetable is first opened (created) CMIS will not display any information since no filter as yet been applied to the timetable view. CMIS displays an outline timetable style simply showing the days and times to be displayed – this is configurable by the user. (Configuration of timetable views is covered in more detail in the Screen Configuration course).

In order to apply a filter to the timetable view, the mouse cursor is placed within the timetable view and right-clicked (Alt-click). This opens a menu window – half way down the menu we can see the option **Filter**.
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Figure 14 - Filtering the timetable

When the filter option is selected a Filter window is opened

![Timetable Filter](image1.png)

Figure 15 - Timetable filter

This window contains a number of filter tabs, the most commonly used of which are:

- **Basic** – filter Department, Unit (Module) and Staff
- **More** – filter Building, Room and Weeks
- **Student** – to display student timetables
- **Programme** – to display Programme (Course) timetables

From here it is possible to define what aspect(s) of the timetable will be viewed in the timetable window, for example, a simple view showing the timetable for an entire Department or a more refined view which filters to different elements of the timetable e.g. Department + Lecturer + Building.

It is important here to note that the timetable filter is cumulative which means that only those events which fulfill all of the aspects of the filter will be shown. Below we have a timetable which shows events for the Information School, located in the Arts Tower – the Information School has a total of 140 events, but only one is scheduled in the Arts Tower.
Should the timetable show events that were not expected, or not show events that were expected, then the timetable filter must be checked to ensure that it has been correctly applied. The Clear button on the timetable filter can be used to empty the filter completely and allow elements to be reselected.

Note: If you Clear and then click the OK button you will filter to ‘All timetable data’ which will display the entire University timetable in a single window and which will take a very long time to load.

**Display the Filter button on the timetable**

To prevent having to right-click to get the timetable filter window, it is possible to display a Filter button on the side of the timetable window.

To show this button, move the pointer to the right-hand border of the timetable (immediately after the vertical scroll bar). Alternate mouse-click (alt-click) and from the pop-up menu, select Buttons.
The Timetable filter

The timetable filter has, as described above, a number of tabs across the top which allows the selection of different elements from the timetable. The **Basic** tab and the **More** tab are the most frequently used when filtering a timetable.

The Basic tab allows filtering by Department and Module and by Lecturer. The Basic tab also contains an option to filter by Course and Class Group (if the timetable is non-modular).

The Basic tab allows the timetable to be filtered by:

- **Source** – a high level filter e.g. showing teaching and non-teaching events
- **Department** – filters to Department, Faculty or School
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- **Module** – filters to Module (Department must be selected first) and also allows filtering by module sub-group
- **Course** – filters to Course (non-modular) timetables
- **Lecturer** – selects the timetable of an individual Lecturer
The More tab allows filtering by Building and Room as well as by Equipment (this allows the user to produce timetables for portable items of equipment), weeks, event type and weekday.

![Timetable filter](image1.png)

**Figure 19 - Timetable filter - More tab**

The More tab allows the timetable to be filtered by:

- **Building** – a building at the University, typically containing a number of rooms
- **Room** – an individual room (Building must be selected first)
- **Equipment** – an item of equipment
- **Weeks** – a week range from the timetable e.g. Semester 1
- **Type** – the Event type (not the same as Module type)
- **Weekday** – displays a single day only
The other most commonly used filters when viewing timetables are the **Student** tab which allows student timetables to be viewed (either by student name or number) and the **Programme** tab. The Programme tab allows Programme timetables (modular – based upon the Core and Optional modules attached to a Programme) to be viewed.

*Figure 20 - Timetable filter - Student tab*

If either a Department or Programme is also selected in this tab, then only students registered with that Department or Programme will be displayed (rather than all students).

*Figure 21 - Timetable filter - Programme tab*

The Programme tab allows the timetable to be filtered by:

- **Programme** – Programme Code and Name
- **Year** – the year of study of the Programme
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- Options – displays either/both of Core and Optional modules

Other tabs on the timetable filter

The other tabs allow the timetable view to be further filtered according to different criteria.

**Query** tab – allows filters to be applied to the timetable table in the CMIS database. Also used when filtering a Master view timetable.

**Title** tab – determines how the timetable title will display on the window

**Events** tab – enables other events, which are not part of the main filter to be displayed.

**Expression** tab – allows the user to use SQL expressions to filter the timetable

**Bookings** tab – allows filtering of ad hoc events e.g. meetings

**Campus/Catering** tab – allows filtering to events with booked catering (not used at Sheffield)
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Changing the day/time of timetable events

Once events have been created in the timetable there will be many occasions when modifications will need to be made. These modifications will include:

- Changing the start time of an event
- Changing the day on which an event is scheduled
- Changing the duration/length of an event

There are two ways from within a timetable view of changing the day and time that an event has been scheduled for. First is to open the event and manually edit the day/time, secondly is to drag and drop the event within the timetable view.

Edit Event

Open a timetable event

- Double click event to open  
  or

- Alt-click | Edit event

Change the Day, Start or Length (Len) of the event as required. When you click OK you will see the event modifications applied.
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Figure 22 - Editing day, time and duration

Other modifications such as changes to weeks or to the resources scheduled may also be made here.

Changes via the timetable view

Changes to Day, Start time and Duration of an event can be made in the graphical view of the timetable.

To change the Day/Time of an event,

- Select the event in the graphical display
- Click and Drag the event to its new Day and Time

![Figure 23 - Drag and drop event to new day/time](image)

To change the duration of an event on the graphical view

- Select the event in the graphical display
- Place your cursor at the edge of the event (you will see a double-headed arrow)
- Click and drag the edge of the event to its new finish time

Figure 24 - Modifying event duration
CMIS Setting – modifying the timetable view

There are a number of configuration settings that help to determine how the timetable view will work.

Time display

When making modifications to events on the timetable, the Event window can display event duration either as Hours and Minutes (1:30 – see Figure 19 above) or simply as minutes (90 – see Figure 10 above). The user can decide how the window will show the duration.

To change the display

- Go to the Options menu
- Choose Configuration | Settings

This opens the Configuration window

![Configuration window](image)

Figure 25 - Configuration settings
• Click on the + next to Miscellaneous

![Configuration settings - display event duration](image)

Figure 26 - Configuration settings - display event duration

To display event duration as hours and minutes, tick the box ‘Show times as HH:MM...

To display event duration as minutes only, leave this box unchecked.

**Grid sizing**

Grid sizing determines how events will be placed when using drag and drop in the timetable view. For example, a grid sizing of 30 minutes, will mean that when events are dragged on the timetable view, they will start either on the hour, or on the half hour.

To change the grid sizing, first open the Configuration window as described above.

In the Configuration window go to the Timetabling section and choose the Window subsection
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Figure 27 - Configuration settings - Grid size

- Select ‘Grid size (in minutes)...’

To change the grid sizing, change the number of minutes in the box at the bottom right of the window. The lowest figure that can be entered here is 1 (minute) – although this can make dragging and dropping more difficult.

Cell resizing

Cell resizing determines how many minutes an event’s duration will change by when making alterations in the timetable view. So a value of 10 minutes would mean that an event which finishes at 10:00 could be adjusted to 10:10, 10:20, 10:30 etc.

To change the cell resizing, first open the Configuration window as described above.

In the Configuration window go to the Timetabling section and choose the Window subsection
Figure 28 - Configuration settings - Cell resizing

- Select ‘Cell resizing (in minutes)’...

To change the grid sizing, change the number of minutes in the box at the bottom right of the window.
Part 4
The List View

In this section you will learn

- How view a timetable in list format
- How the list view can be configured
- How to filter list views
- How to sort list views
The List View

We have seen above the way in which CMIS displays timetables in a graphical format, but it is also possible to view the data as a list (please note that the list view is not used in Master view timetables).

Moving the mouse to the border at the bottom of the graphical view you will see that the cursor changes to a double-headed arrow. By clicking and dragging this arrow upwards, the list view is displayed.

![The List view](image)

The List view provides a way of displaying information supplementary to that shown in the timetable view. The List view is also configurable by the user and can be filtered and sorted to display information in a way that best suits the way a particular user works.

In the example shown above the graphical timetable is filtered to INF104, as before. But the list is showing some additional information to that displayed in the graphical view; you can see columns showing the type of room requested the event ID, week range that is booked, size of room requested and the user who made the booking.
You can also see in the list that each booking has a yellow flag on the left hand side, this indicates that the event has been scheduled (given a day and time). Events that have not yet been scheduled will have a white flag instead.

**Configuring the List view**

Within CMIS it is possible to configure the list view independently from the graphical view. Thus a user can decide which columns to display, in what order the columns will display and it is also possible to apply filters to these columns and to sort the columns so that data shows in a desired order, e.g. by module code.

In order to change which columns are displayed the cursor is placed in the list view. Alt-click then opens a sub-menu and the user needs to select the option 'Modify column details'.

![Figure 30 - Configuring the List View](image-url)
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In the Modify columns window which opens it is possible to:

- Select the columns to display – visible or hidden
- Decide the width of each column – variable or fixed
- Choose the contents of each column – short (e.g. module code), long (module name), or linkcode
- Decide how each column will be aligned – left, centre or right
- Apply a label to a column – change the column header
- Sort each column – case sensitive, case insensitive or numeric
- Decide the printed width of each column – in inches

![Figure 31 - Modify columns window](image)

The order in which a column is displayed can also be changed by selecting a column and either using the UP and DOWN buttons to the right of the window, or else dragging and dropping the column to the desired place on the list. The higher up the list the column is placed, the further to the left it will appear in the list view.
Column Labels
The label function allows each column to be given a different header to the default, for example to rename the Time column as Start. To change the label simply select the column to be changed and enter the desired text in the box marked Label.

Figure 32 - Adding a label

Figure 33 - Column label
Filtering the List view

The list view can also be filtered to select data determined by the user. In this case the filter acts as a sub-filter to that of the main graphical timetable view. Thus the filter can only filter to events that have already been selected via the graphical view filter.

In the list view there are two methods of applying a filter. The first, simpler method is to point to the data item that you wish to filter by in the list, then

- Alt-click
- Select Column | Filter

You will then have two options

- Filter to records with data =
- Filter to records without data =

In the example above, the timetable view shows module INF104, but the list view is being filtered so that only PRACTICAL events are displayed, the results of the filter are shown below.
Please note that the graphical view has not changed, it is still filtered to INF104 and shows all events, only the list view has been filtered to show Practical events; so the list view filter only affects the data displayed here. If the user finds that there is an unexpected mismatch between the events displayed in the graphical view and those in the list view, then a check needs to be made to see whether the list view has been filtered.
To check whether and how the list view is filtered, place the cursor in the list and Alt-click

- Select Column | Filter

The bottom line of the sub-menu shows the current filter, if any, applied to this list. If the filter is incorrect the user can simply select on the Clear filter option and the list view filter will be removed.

The second method of filtering the list views allows slightly more flexibility in filtering the data. In this case again Alt-click

- Select Column | Filter
- Edit Filter

The window Filter information for display is opened.
In this window we can see that two different filters can be applied to each column, and that they can be applied as AND/OR filters: so in the above example a filter has been applied which shows events for either INF103 or INF104.

The graphical view has been filtered to show all events booked to the Information School, but the list view has been further filtered to show only two modules.
A further option when applying filters to the list view is to use different operators on the data. In the example above the Equal to (=) operator was used.
By clicking on the Column filter details box, a list of other operators is displayed. These include:

- Less than <
- Less than/equal to <=
- Greater than >
- Greater than/equal to >=
- Contains
- Doesn’t contain
- Date

So it is possible to filter the list to show events of particular sizes, between specified date ranges or those which contain particular items.

Note that when filtering columns that contain figures, the numerical filter expressions, e.g. #Less than <, should be used. If filtering a date column the Date expressions should be used.
Sorting list views

The list view can also be sorted by the user to display data in the desired order (ascending or descending). The simplest way to sort a list view by a particular column is to click the column heading of the column you wish to sort by. The list below has been sorted into module (code) order by clicking the Unit column header – the data is now displayed with INF103 before INF104. Clicking the column header again will resort the list in the order INF104 followed by INF103.

Multiple sorts can be applied by clicking one column header followed immediately by a second column header. For example by clicking on Day followed by Time the list will be placed in chronological order from Monday 9:00 to Friday 17:00.
Default sort order
To ensure that the list view is always presented in a particular order we can define a default sort order. To do this, alt-click in the list view and select ‘Define default sort’.

Figure 41 - Default sort
Any of the columns that have been selected for display in the list view can be included in the sort. This can be done either by highlighting the column to be included in the sort then clicking on the word No (it will toggle to Yes), or by highlighting the column to be included and placing (or removing) a tick in the box ‘Include column in sort’ at the bottom of the screen.

In a similar way the sort order can be determined by clicking on the word Ascending (it will toggle to Descending) or by placing (or removing) a tick in the box ‘Sort in ascending order’.

The sort order can be adjusted by moving columns up and down in this list either by highlighting the column and dragging it to its correct place, or by using the UP/DOWN buttons to the right of the window.

In the example above the sort included DAY and TIME – this will place the list in order with events starting at 9:00 first, if there are two events at 9:00 on different days then the event which is earlier in the week will come first.

To order the list in chronological order the sort-order needs to be changed to that shown below with TIME first; this is because the sort list works from the bottom up.