

# **Digital Signage for Churches and other Establishments**

## **User manual**

An easy to use Digital Signage system for use in a Church or other facility.

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File: Digital\_Signage\_User\_Manual.odt  
Date: 18 February 2024  
Issue: 1

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# Introduction

This document has the user instructions to create, manage and maintain this Digital Signage installation for Churches and other establishments.

This **Digital Signage** system is one that displays a slide presentation on one or more screens in a facility. The presentation can be created using various methods and is managed by sending emails to the system. It is designed to be simple to run and maintain.

This project requires two roles to manage it. They are:

Role 1 - Presentation Creator

Role 2 - System Administrator

Each role requires a specific level of expertise and skills, which are explained below. Each role can be done by more than one person and some people could be doing both roles.

Almost all interactions with the Digital Signage system are done via *emailed* commands. This method was chosen to make using the system as easy as possible.

The commands listed for each role can be issued by either roles. The distinction here is more to divide the commands between the roles.

## Intended audience

This document is intended for those who are going to take on either of the two roles. A common skill is to be able to send emails with attachments.

## The roles

### Role 1 - Presentation creator

This role is for those that are going to do the main purpose of this project, i.e. creating and maintaining the presentations.

This role needs a good insight on how to communicate information using slide presentations. This is more of an artistic than a technical skill. After all, what the presentation tries to communicate is the main purpose of any Digital Signage system.

The skill set for this role also includes experience with *Google Slides*, *Microsoft PowerPoint* or *LibreOffice Impress*.

For Google slides, done in a web browser, the requirements are:

- Access to Google Slides using a Google account.
- Know how to create and maintain a Google Slide presentation. There are many YouTube videos that can be used to learn about Google Slides.
- Know how to share the presentation if more than one person is going to maintain the Google Slides presentation.

For Microsoft PowerPoint, done using the Microsoft Office program, the requirements are:

- Access to the Microsoft Office suite of programs, which includes the PowerPoint program. This may require an account with Microsoft.

- Know how to create and maintain a PowerPoint presentation. There are many YouTube videos that show how to create a PowerPoint presentation.
- Know how large the presentation file is before sending it via email. Normally emails can only send up to 20Mb as an attachment in total.
- Since sharing of PowerPoint files is more complicated, this precludes others from updating the same presentation.

For LibreOffice Impress, done using the LibreOffice suite of programs, the requirements are:

- Have the LibreOffice suite of programs installed on the device used to create the presentation.
- Have the special extension "ImpressRunner" installed on the device to enable the automatic starting of the presentation.
- Know how to use the LibreOffice Impress program to create and maintain the presentation. There are many YouTube videos that show how to create a Impress presentation.
- Know how large the presentation file is before sending it via email. Normally emails can only send up to 20Mb as an attachment in total.
- Since sharing of Impress presentations is more complicated, this precludes others from updating the same presentation.

## Role 2 - System Administrator

This role is for those looking after the system itself. As with all computing devices there are a number of tasks that are needed to manage the device itself. This role is also responsible for updating various aspects of the system.

This role requires a good knowledge of the Linux operating system that is used on the device and of the BASH shell commands and scripting. Knowledge and experience with Python programming is good to have.

It is important that the System Administrator knows how to access the system directly using SSH terminal access (i.e. *Putty*), "*VNC viewer*" or with a keyboard/mouse. This is needed only when it is necessary when it cannot be done using the email commands.

The System Administrator will receive a *daily status* email and needs to check this for any errors or problems that may have occurred.

## Email commands

For both roles the interaction with the Digital Signage system is primarily done using email. An email simply contains commands, additional data and attachments as required.

The commands that are to be performed by the Digital Signage system are all in the message body. Each command consists of a *single line*, starting with the command word, followed by at least one space and then the additional information that the command requires. Some commands require attachments and some commands don't need additional information.

The next chapters contain the instructions on how to issue these commands and what each one does. It also states what additional data and/or attachments the command requires.

## Security

The Digital Signage system only allows authorised senders to email commands. The list of authorised senders is managed by the System Administrator.

Messages received that are not from any of the authorised email senders will be ignored and will be stored in a separate folder on the system. These messages can then be inspected by the System Administrator. These messages will be removed after a configurable number of days.

## Sending an email

Since both roles are done by sending an email the following are the general steps to create and send such an email.

- 1) Open a new email message  
Using your preferred email facility, open a new email message. *Do not send a reply message.* Make sure that the sender email address displayed in the email header is for the one that is authorised to send commands.
- 2) Enter the "To:" address  
Enter the email address of the Digital Signage system. For the actual email address, see the information for the specific implementation.
- 3) Enter the "Subject:" line  
Enter any text here. Recommended is to write what command is going to be emailed as this will show up in your "sent" messages folder and will make it easy when looking up previously sent emails. The Digital Signage system ignores the subject text.
- 4) Enter the command line  
In the message body enter the command line. The first word on this line is the command to perform. The rest of the line has additional information or "data" as required by the command. Separate the command word from the data by at least one space. Make sure this data conforms to the requirements stated for each command. Command and data must be on a single line and cannot span multiple lines. Automatic word wrapping that the email system does is not important as that is only there for readability.
- 5) Enter another command line  
It is possible to enter more than one command line in the email, although this is not recommended as only the last command that generated a trigger file will be acted upon. There are some commands that do not generate a trigger file, so these can be in the same email. Any line in the message that is not a recognised command will be ignored. This means that any automatically added signature in the email message will be ignored.
- 6) Add any attachments  
If the command requires this, add the attachment to the email message. Make sure it is within the limits of the email service being used. Normally a maximum of 20Mb can be attached to an email.
- 7) Send the email

Use the "Send" button to send the email to the Digital Signage system. The system will read the email when it next checks the inbox for messages. The timing of reading emails is implementation dependent.

## Note: This is important!

Normally, a presentation is ***transient*** and will be forgotten when a new presentation is started.

There is a facility to save the current presentation by using the "save\_now" command. This is fully explained in the next chapters. By saving the presentation data and any attachments, these "saved" presentations can thus be run as and when required.

Attachments that have not been used for a configurable number of days will be automatically deleted. This saves storage space as some devices may have limited storage resources.

The saving of the current presentation is especially useful for *Google Slides* presentations. The URL or web address of a *Google Slides* presentation does not change once a presentation has been created. When making changes to it, all that is needed is to restart or run the saved presentation. Therefore the same presentation information can be used many times. If it was saved, all that is needed is to send a command to run that saved file. That way you can maintain a number of presentations and have them re-run after modification.

# Role 1: Presentation creator

This chapter has the instructions for those that are going to create and maintain the presentations for this system.

It is assumed that the person designing and updating a presentation knows how to do a presentation. Currently the implemented presentation methods are: *Google Slides*, *LibreOffice Impress* and *PowerPoint*.

Presentation creators can start, stop, save and run a presentation simply by emailing the correct command to the Digital Signage system.

## Presentation commands

This section describes all the commands that are specific to this role. In the table below, the indication "**Data to be provided:**" is what the command wants to see as additional data on the command line. Not all commands require more data.

NOTE! *The command word can be in upper or lower case. The additional data must be in the correct case when specifying folder or file names. It is recommended to use lowercase for all commands and data. Automatic capitalisation is OK as it will be changed to lowercase.*

Command	What the command does and the required data
google	<p>Start a <i>Google Slides</i> presentation by sending the "URL" web address of the presentation in the command line.</p> <p><b>Data to be provided:</b> The Web Address of the presentation.</p> <p>Example (of course the URL is abbreviated here):</p> <pre>google https://docs.google.com/...&amp;delayms=15000</pre> <p>See the section below on instructions on how to create and maintain a <i>Google Slides</i> presentation and how to email it to the system.</p>
PowerPoint	<p>Start a <i>PowerPoint</i> presentation by sending the presentation as an attachment to the email.</p> <p><b>Data to be provided:</b> No further data is required, but an attachment with the <i>PowerPoint</i> presentation file is required.</p> <p>The <i>PowerPoint</i> file must have the file extension ".<b>ppsx</b>" so that it starts automatically. The file size has to be less than 20 megabytes as that is the maximum most email systems allow attachments to be.</p> <p>See the section below on further instructions on how to create and maintain a <i>PowerPoint</i> presentation.</p>

Command	What the command does and the required data
Impress	<p>Start a LibreOffice Impress presentation by sending the presentation as an attachment to the email.</p> <p><b>Data to be provided:</b> No further data is required, but an attachment with the <i>Impress</i> presentation file is required.</p> <p>The LibreOffice Impress file must have the file extension <b>".odp"</b>. The Impress presentation must be set to automatically start by using the "ImpressRunner" extension to the Impress program. Make sure that the presentation loops and that the slides advance after a number of seconds.</p>
Restart Start	<p>Start or restart the current presentation.</p> <p><b>Data to be provided:</b> No further data is required.</p> <p>Both the "restart" and "start" command do the same action and will start the presentation that was running last.</p>
Run	<p>Run a previously saved presentation by adding the name of the saved presentation with this command. It must be an existing filename. (See the "save_now" command below)</p> <p><b>Data to be provided:</b> The filename of the saved presentation.</p> <p>Example:</p> <pre>run name_of_saved_file</pre> <p>Make sure the filename is exactly the same as the one saved.</p>
save_now	<p>Save the current presentation to a permanent file. Add the name for this file with this command. If the filename already exist, it will be overwritten by this command.</p> <p><b>Data to be provided:</b> The name to give to the current presentation.</p> <p>Example:</p> <pre>save_now my_presentation</pre> <p>Give a filename that defines what the presentation is about and make sure that the filename has only alpha-numeric characters (upper and lower case is significant!) and underscores. No spaces or other characters allowed.</p>
Stop Halt	<p>Stop the current presentation.</p> <p><b>Data to be provided:</b> No further data needed</p> <p>This command stops the current presentation and reverts back to the desktop screen.</p>

Table 1: Presentation creator commands



## PowerPoint presentation

It is assumed that the presentation creator knows how to create and modify a *PowerPoint* presentation. It is recommended to use only features that work correctly with LibreOffice "Impress" program. This may need a bit of experimenting as it is not yet clear what works in *PowerPoint* but does not work in the LibreOffice program. During development *PowerPoint* was tested and working, but there were issues found with some of PowerPoint's features.

A *PowerPoint* presentation needs to be a self starting show. This means that the filename must have the extension "**.ppsx**". If that is not the case, the presentation will be refused.

## How to send a PowerPoint presentation

The following are the steps to create a *PowerPoint* presentation.

- 1) Create or modify a presentation in Microsoft PowerPoint.
- 2) Save the presentation as a "PowerPoint Show (\*.ppsx)".

Make sure the file size of the presentation is 20 megabytes or less.

- 3) Create a new email message as described before.

- 4) Enter the command line with the word: **powerpoint**

Type the word PowerPoint on a line by itself. No further data needs to be added to this line.

- 5) Attach the *PowerPoint* presentation to the email.

Make sure that the attachment is within the limits of the email service used. Usually this is anything up to 20 megabytes.

- 6) Send the email message

The system will read the email and if all is OK, it will start the new presentation.

## Google Slides presentation

It is assumed that the person creating and maintaining a presentation using *Google Slides* knows how to do this. A Google account to use this facility is required. There are excellent YouTube videos with tutorials on all aspects of *Google Slides*.

*Google Slides* uses a web browser to create and maintain the presentations.

## How to create a Google Slides presentation

Go to the *Google Slides* website where you can create the presentation. The web address is: <https://docs.google.com/presentation/> Bookmark this page for ease of access later.

You will see your created presentations, if you have any. To add a new one, click the PLUS button at the bottom right, select what theme you want and create the presentation. To modify an existing one, click on the picture of the presentation to modify.

*Google Slides* will save the presentation automatically during creation and modification.

## Obtain the web address (URL)

When finished with the presentation, click on the "**File**" menu, select "**Share**" and click on the "**Publish to web**" option. This will present you with a set of options. With "**Link**" underlined, go through the options and select the "**Auto-advance slides**" with the time that suits your presentation. Recommended is to select at least 15 seconds, while 30 seconds will be better as it gives people time to read the slide. There is a way to change this by modifying the web address (URL) that this option generates.

Tick the box for "**Start slideshow as soon as the player loads**" so that the presentation starts as soon as it is loaded by the system.

Tick the box for "**Restart the slideshow after the last slide**" to ensure that the presentation is looping.

Copy the line with the "**https://...**" text and save it. This is the web address of the presentation. This web address is unique to this presentation and will not change. This makes it easy to modify the presentation and not having to email the web address each time.

Make sure to save the web address (or URL) for later emailing to the Digital Signage system.

## How to send the Google Slides presentation

The following are the steps to take to send the presentation details to the Digital Signage system.

1) Create the slide show presentation with *Google Slides*.

2) Create a new email message.

3) Add the command line

In the message body add the command line with the first word "**google**" followed by the URL or web address you got when you shared the *Google Slides* presentation.

For example (of course the URL is abbreviated here):

```
google https://docs.google.com/presentation/d/e/2..&delayms=15000
```

Make sure that the whole line is there. Don't worry about any line wrapping as the URL web address is very long.

4) Change the slide timing

If need be, you can adjust the timing between slides by changing the very last number in the web address line which reads: "delayms=**15000**". Change the 15000 to 20000 for 20 seconds between slides, or whatever delay between slides is required.

5) Send the email

The email will now be read and the new presentation will be started.

## LibreOffice Impress presentation

The LibreOffice Impress is similar to PowerPoint. It requires the creator to have LibreOffice installed on their computing device. This is free software. Knowledge on how to use this program is required. The menus and methods are different, but similar, to PowerPoint. There

are slight differences when running the presentation on a Raspberry Pi as it is on a Windows or Linux device. This may need some experimenting.

The LibreOffice extension "ImpressRunner" is required to be installed and used for each presentation. This allows the presentation to run automatically when opened by the Impress program.

## **How to create an Impress presentation**

Creating and maintaining an Impress presentation is very similar to a PowerPoint presentation. The contents, slide animations, transitions, etc. are of course entirely up to the creator of the presentation.

## **How to send an Impress presentation**

The following are the steps to create a *Impress* presentation.

- 1) Create or modify a presentation in LibreOffice Impress. Set the timing between slides as required.
- 2) Click on Auto-start icon in the top left to enable the auto-start.
- 3) In the menu item "Slide Show" select the "Slide Show Settings".
- 4) Click to select the option "Loop and repeat after" and leave the time to all zeroes.
- 5) Save the presentation and make sure that the file is within the limits of the email system used. Usually email systems allow up to 20Mb of attachments.
- 6) Open a new email message. Add the command "impress" to the message body and attach the Impress presentation to the email. Send the email.

The system will read the email and if all is OK, it will start the new presentation.

## Role 2: System Administrator

This role is a lot more involved as this is to manage the system itself.

The following sections have the list of commands that the System Administrator can send to the Digital Signage system. There can be more than one command in an email and there can be multiple emails. Note that the last command that created a trigger file is acted on. All previous trigger commands are ignored. It is recommended to send only one trigger command each time, unless the command does not generate a trigger file.

*Commands that generate a trigger file are marked with a \* below the command word listed.*

The information to email depends on the command used. See the command explanation below for what information is to be added and how.

### Emailed System Administrator commands

The following table shows all the commands that are associated with managing the system and that are emailed to the Digital Signage system.

Command	What the command does and the required data
crontab *	<p>Update the crontab. This is for knowledgeable SysAdmins only.</p> <p><b>Data to be provided:</b> no further data on the command line but attach the file that will be the replacement for the existing CRONTAB.</p> <p>This command replaces the <u>entire</u> CRONTAB with a new set of entries as given in the attached file. Remember that all entries are to be in the file. It is recommended to maintain this file on the computer used by the System Administrator.</p>
debug	<p>Change the DEBUG flag.</p> <p>This is used for diagnostic purposes and during development. When set to "True" it generates debug messages that are written to the log file. This is normally used during development but can be useful for diagnostic purposes when in production.</p> <p><b>Data to be provided:</b> Either "on" or "off"</p> <p>Example:</p> <pre>debug off</pre> <p>Note that when debug is on, the number of messages can be quite large.</p>

Command	What the command does and the required data
delete *	<p>Delete file(s) in the "permanent folder" only.</p> <p><b>Data to be provided:</b> The name of the file(s) to be deleted. Do not add the folder name, but give the exact filename.</p> <p>Example:</p> <pre>delete google11 test_presentation</pre> <p>This removes the named files from the "permanent" folder.</p>
download *	<p>Email any file as an attachment to the System Administrator's email address. This command is intended to get a copy of the files in the production folders. It is mainly to be used to get the latest CRONTAB from the system in case it was lost.</p> <p><b>Data to be provided:</b> The name of the file, including the folder name to be emailed, or the word "crontab" to get a copy of the CRON entries.</p> <p>Example:</p> <pre>download crontab</pre> <p>This results in the creation of the crontab.txt file from the crontab entries.</p>
email_auth	<p>Change the list of email senders that are allowed to send commands to the system.</p> <p><b>Data to be provided:</b> A list of comma separated email addresses.</p> <p>Example:</p> <pre>email_auth emailadrs@example.com,anotheremail@gmail.com</pre> <p>There is no limit to the number of email addresses, but keep it to the absolute minimum. Always send all email addresses each time as the list is overwritten by the data provided.</p>
list *	<p>Email a list of files in specified folders.</p> <p>This command provides a method to get the list of filenames from one or more folders. See the "System" documentation for the list of folders.</p> <p><b>Data to be provided:</b> Enter the names of the folders to get the list of files from, each one separated by a space or comma.</p> <p>Example:</p> <pre>list permanent attachments</pre> <p>Which gives a list of files in these two directories. The email is send to the email address of the System Administrator that is in the main configuration file.</p>

Command	What the command does and the required data
reboot *	<p>Reboot the system.</p> <p>This command is to have the system reboot itself. Use this only if the system requires it.</p> <p><b>Data to be provided:</b> No further data required on the command line.</p> <p>Use this command with caution.</p>
save_now *	<p>Save the current presentation to a permanent file.</p> <p>This command saves the current presentation in the "running_now" trigger file to a file in the "permanent" folder. The filename is given on the command line and <i>must not have any spaces in it</i>. Any attachments are also saved to the "permanent" folder.</p> <p><b>Data to be provided:</b> Filename to save the current presentation as.</p> <p>Example:</p> <pre>save_now name_of_presentation</pre> <p>If the filename already exists, it will be overwritten. Make the name something that identifies what presentation it is.</p>
screen *	<p>Turn ENERGENiE power sockets on or off.</p> <p>This command can only be issued if ENERGENiE power sockets are used to control the screens used by this system.</p> <p>This command turns the power socket indicated by the first argument in the data on or off.</p> <p><b>Data to be provided:</b> Socket number (0 - 4) followed by "on" or "off"</p> <p>Example:</p> <pre>screen 0 on</pre> <p>Note that socket number 0 turns on/off all sockets, while numbers 1 to 4 only the specified socket.</p>
shutdown *	<p>Shuts down the system completely</p> <p>After stopping any presentations and the email checking program, it will sync up the file system, pause to get things stable and then shutdown the system.</p> <p><b>Data to be provided:</b> No further data required.</p> <p>Use this command when the system is to be powered down. It will provide for a managed shutdown rather than just powering it off.</p>

Command	What the command does and the required data
Update *	<p>Update a program or script file on this system. This command is intended to replace existing scripts and programs in the main production folder with new versions. This only applies to files in the production folder not in any other folders.</p> <p><b>Data to be provided:</b> The name of the file to be replaced and attach the replacement file to the email.</p> <p>Example:</p> <pre>update start_presentation.sh</pre> <p>The attachment can have any name, but this attachment will replace the file with the name in the command line.</p>

*Table 2: System Administration emailed commands*

More information is given in the "System documentation".

## System Administrator direct access

The following instructions are for when the System Administrator (SA) has direct access to the system itself.

The System Administrator can execute a variety of presentation commands when accessing the system directly, either via *SSH*, *VNC viewer* or using a keyboard and mouse. It is executed from the command line and helps in managing the system.

A special script is available for this purpose.

The script command format is:

```
issue_command.sh command [parameters]
```

This script executes a number of commands as described below to manage presentations and other aspects of the Digital Signage system. At the command prompt, enter the following to get some help information about what this script can do:

```
issue_command.sh help
```

Which will result in the following "Help" information:

### SYNOPSIS

```
issue_command.sh command [parameters] [...]
```

### OPTIONS:

command - One of these are possible:

stop	Stop the current presentation
restart	Restart the current presentation
start	Start the current presentation
reboot	Reboot the system
shutdown	Shutdown the system
run filename	Run the filename from the permanent folder
turn_on N	Turn power socket N on [N=0-4]
turn_off N	Turn power socket N off [N=0-4]
help	Display this message

This command will allow easy management of the Digital Signage system.

## Additional tasks

There are a few other tasks that a System Administrator will need to do regularly. These tasks are done normally using BASH commands. These will require knowledge of the Linux O/S and of the BASH shell commands and functions.

## Keep O/S up to date

The first one is to keep the Operating System up-to-date. This is normally a manual process whereby the System Administrator accesses the system directly or via SSH. To help in automating this, a simple script was developed to try and automate this process. This is not the best solution, but it works. The script is called: "auto\_update.sh" and is added to the software package. Use this at your discretion as this script is under-developed and needs some additional code to make it more robust.



There is also the "*unattended-upgrades*" feature available for the Raspberry Pi. This is a fully supported package and is easily installed and started. A website with more information on how to install and run the package is [here](#).

## **Backup of the system**

The second one is to make a back-up of the system. It is important to do this regularly. A back-up can be easily achieved by using a back-up  $\mu$ SD card and make a system copy to it. There is a utility on the Pi called: "*SD Card Copier*" and is in the "*Accessories*" menu option. Use this to copy the running  $\mu$ SD card to a back-up one. This will require direct access to the system via the desktop interface and of course direct access to the processor.

# Summary list of email commands

## Management commands

Command	What it does and what to add	Email
crontab	Replace the CRONTAB with the attached file	Y
debug	Set debug flag On or Off	
delete	Add filename(s) to be deleted in the permanent folder	Y
download	Add filename to be emailed as an attachment	Y
email_auth	Replace the list of authorised email addresses	
list	Add the folder names for which to get the list of files	Y
reboot	Reboot the system	
save_now	Save the current presentation to a permanent file	Y
screen	Add the screen number (0-4) and [on/off]	
shutdown	Shutdown the system	
update	Add the name of the file to replace and add the file as an attachment	Y

## Presentation Commands

Command	What it does and what to add	Email
google	Add URL/Web address	
halt	Stop the presentation	
impress	Attach LibreOffice Impress presentation file with file extension <i>.odp</i>	
powerpoint	Attach power point presentation file with file extension <i>.ppsx</i>	
restart	Restart the last presentation	
run	Give the name of the permanent file to run	
save_now	Save the current presentation to a permanent file	Y
start	Start the last presentation	
stop	Stop the current presentation	

The column "**Email**" indicates if this command sends an email to the System Administrator when the command was successful or when an error was detected.

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