

Introduction

In this document, Thinvent would like to describe digital signage, description of hardware required for it and the customer's requirements.

What is Digital Signage?

Digital signage is a form of electronic display that shows information, advertising and other messages. Digital signs (such as LCD, LED, plasma displays, or projected images) can be found in public and private environments, such as retail stores and corporate buildings.

Advertising using digital signage is a form of out-of-home advertising in which content and messages are displayed on digital signs with a common goal of delivering targeted messages to specific locations at specific times. This is often called "digital out of home" or abbreviated as DOOH.

The benefits of digital signage over traditional static signs are that the content can be exchanged more easily, animations can be shown, and the signs can adapt to the context and audience, even interactively. Digital signage also offers superior return on investment compared to traditional printed signs.

The most common applications of digital signage are as follows :

- **Public information** – news, weather and local (location specific) information, such as fire exits and traveller information
- **Internal information** - corporate messages, health & safety, news, etc.
- **Advertising** – either related to the location the signage is in or just using the audience reach of the screens for general advertising
- **Brand building** – in-store digital signage to promote the brand and build a brand identity
- **Influencing customer behaviour** – directing customers to different areas, increasing the dwell time on the store premises
- **Enhancing customer experience** – applications include the reduction of perceived wait time in restaurant waiting areas, bank queues, etc., as well as recipe demonstrations in food stores
- **Enhancing the environment** – with interactive screens

Hardware description

The customer needs a digital signage solution where they will have an LCD screen and a thin client. The customer will provide us with a thin client with the following configuration :

- VIA C7 1GHz fanless processor
- CN700 chipset
- Audio output
- VGA video output
- 512MB flash
- MB RAM

This configuration is sufficient for the digital signage application that has been mentioned in the customer's email. However, the 512MB flash is not sufficient for content storage and an additional USB pen drive will be required in case the content is very high. If the content size is less than 512MB, then the customer can directly procure a 1GB IDE flash along with the device.

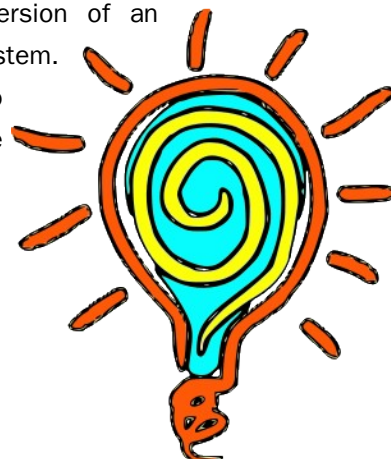
Customer's Requirements

The system is a network connected digital signage solution. The screens will be used to project a set of video files. Below the video files, there will be tickers for stock prices and for latest news headlines.

Proposed Solution

We will provide the firmware that resides on the client device flash. The firmware will comprise of a complete Linux operating system environment along with remote management and monitoring. We will also provide the application that delivers the digital content to the screens.

The customer will also provide us with a hosted web server running the latest version of an enterprise Linux Operating System. On this, we will host the video content and also provide streaming of the tickers.



Video Content

The first step in the project is to display the video files. For this purpose, we will define a play list format and a video format. The customer needs to communicate to us, the resolution and bit-rate of video along with the encoding format that they wish to use. Thinvent recommends that the customer use MPEG-II video format. The video files should be sized to exactly the same resolution as the video frame that customer intends to use on the LCD screen.

On the other hand, if the source video is of lower quality such as a DTH broadcast, then we can take the source video of lower resolution and upscale it during playback. The bit rate should not exceed 2 Mbps. 2 Mbps MPEG-II is classified as DTH video quality and provides very high video quality.

MPEG-IV video can also be provided. To our understanding, 1 mbps MPEG-IV video will play without any glitches on the given hardware configuration. MPEG-IV video has the advantage that the bandwidth consumption while synchronising video files from the server to the digital displays will be low.

The method of working will be as follows:

- The customer will upload the video files as well as the play list on their web server in a designated directory.
- This directory will be password protected using the httpasswd mechanism.
- The digital signage clients located in various locations will connect over the Internet to this web server and download the play list.
- After downloading the play list, the clients will synchronise each video file onto their local disc.
- In case a video file available on the local disk is no longer mentioned in the play list, it will automatically be erased.
- Thus the clients will have a local copy of the same content as available on the web server.
- The clients will then play all the video files mentioned in the play list one after another, i.e. sequentially, without any break.
- After the last video file is played, the play list will loop and the video will again start playing from the first item in the play list.

Ticker Display

The second part of the project involves the stock and video tickers. We have been to the BSE/NSE websites and realised that the tickers provided there are not available for public consumption. This means that we cannot pull the content of those tickers and render them on our digital signage screens. Therefore the customer will need to provide us with a source of the news and the stock price tickers.

- We will provide a small application that resides on the web server. This application will pull the stock quotes and the news headlines from the source given by the customer.
- This information will be converted to an open format such as RSS and XML. This content will be made available to the digital signage clients.
- The digital signage clients will periodically poll the web server for these stock quotes and news headlines. The downloaded stock quotes and news headlines will be tickered along the bottom of the screen.
- The tickers will be displayed in an aesthetically pleasing graphical format. For instance, red colour when a stock price is decreasing and green colour when a stock price is increasing. There will be no support for graphics in the stock port and news headline tickers, apart from pre-defined graphics such as an up-arrow when a stock price increases and a down-arrow when a stock price decreases.

Remote Monitoring

The third part of the project involves remote management and monitoring of the systems. Typically monitoring is performed by a central server which periodically, say, every 5 minutes, connects to each of the clients and polls various system parameters. These parameters include:

- Temperature of the processor
- Temperature of the mother board
- Processor utilisation
- Voltage values of various critical components
- Disk space used
- Network consumption



- Whether the software is running properly or not
- Whether the VGA monitor is connected and active or not, etc. etc.

However, in our case, we do not have control over the client side network. Therefore, we do not know how to establish reachability to the clients. In such a scenario, we will run a local monitoring application on each of the clients. Each client device will be running an embedded web server. This web server can be opened to view the graphs of all the parameters that we have mentioned above.

Remote Management

Now let us come to remote management. The embedded web server on the client device provides access to the remote management application. Here again, the major problem will be establishing port forwarding such that the embedded web server running on the client devices is accessible from a central location.

Nevertheless, a comprehensive remote management application will be provided. If required, the clients can establish a VPN connection to a central server automatically when they power-up. For this to go through properly, again, some amount of client network configuration will need to be performed to permit VPN connectivity. This can be investigated and if found possible, then the VPN avenue can be taken.

Our Requirements from the Customer

In this section we will describe the requirements from the customer for the completion of the project.

1. First the customer needs to provide us with the exact LCD screen and the TC that they intend to use in the final product. This is because the resolution and other parameters of the LCD screen are very important for the successful execution of the project.
2. Next the customer needs to freeze on the sources of stock price quotes as well as news headlines. Then need to describe to us the sources from where we can pull such content, as well as provide us with a

document on the format of these contents if required.

3. Thirdly, they need to freeze on the video specifications – what is the video resolution and what is the video bit rate as well as the video encoding format that they are going to use in their digital signage solution.
4. Finally, when the product goes for site installation, the customer needs to ensure that suitable network connectivity is provided between the digital signage clients and the web server.

Network and Bandwidth Requirements

The management system of Linux firmware provides the customer's site administrators the ability to configure various network parameters, such as DNS servers. After configuring these parameters the site administrator can use utilities such as 'Ping' to confirm connectivity.

A minimum network bandwidth of 256 kbps between the clients and the web server will be required for reliable synchronisation of video content as well as regular updation of news and stock content. The frequency at which the video content need to be synchronised as well as the frequency at which the quotes and the headline content need to be synchronised, must be established by the customer. This frequency needs to be in proportion to the amount of bandwidth that is available at the digital signage client location.

Conclusion

We hope to have covered most of the important items in this document. We look forward to receiving your feedback and valuable comments.

We are confident that as a team, Thinvent and the customer can provide an excellent digital signage solution to the end customer.



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