

Thin Client Based on Raspberry Pi 2

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Abstract: Thin Clients can be used to reduce IT Infrastructure costs and are highly scalable. They require very less computing power at the terminal, hence Raspberry Pi 2 can be used as a Thin Client instead of full size Desktops

Keywords: Thin Client, Raspberry Pi 2, Microsoft RDS.

I. INTRODUCTION

In the last two decades, the centralized computing model of mainframe computing has shifted to the more distributed model of desktop computing. But as these personal desktop computers become ubiquitous in today's large corporate and academic organizations, the total cost of owning and maintaining them can become unmanageable. [1]

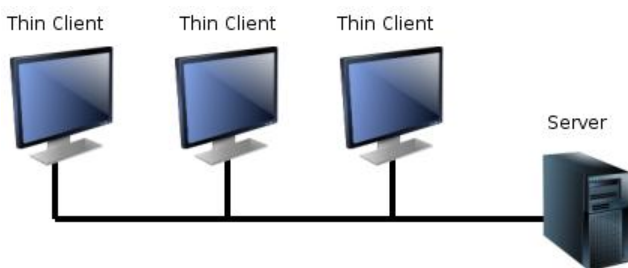


Figure 1. Thin Client Architecture

II. THIN CLIENT

The thin client is Based Upon Raspberry Pi and freeRDP.

1.1 Raspberry Pi 2

The Raspberry Pi 2 Model B is the second generation Raspberry Pi. It replaced the original Raspberry Pi 1 Model B+ in February 2015.

Specifications[2]:

- A 900MHz quad-core ARM Cortex-A7 CPU
- 1GB RAM
- 4 USB ports
- 40 GP I/O pins

- Full HDMI port
- Ethernet port
- Combined 3.5mm audio jack and composite video
- Camera interface (CSI)
- Display interface (DSI)
- Micro SD card slot.
- VideoCore IV 3D graphics core

It has the necessary processing power to run Debian based OS known as Raspbian.

1.2 Raspbian

Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run. However, Raspbian provides more than a pure OS: it comes with over 35,000 packages, pre-compiled software bundled in a nice format for easy installation on your Raspberry Pi.[5]

1.3 freeRDP

FreeRDP is a free implementation of the Remote Desktop Protocol (RDP), released under the Apache license. Enjoy the freedom of using your software wherever you want, the way you want it, in a world where interoperability can finally liberate your computing experience.[6]

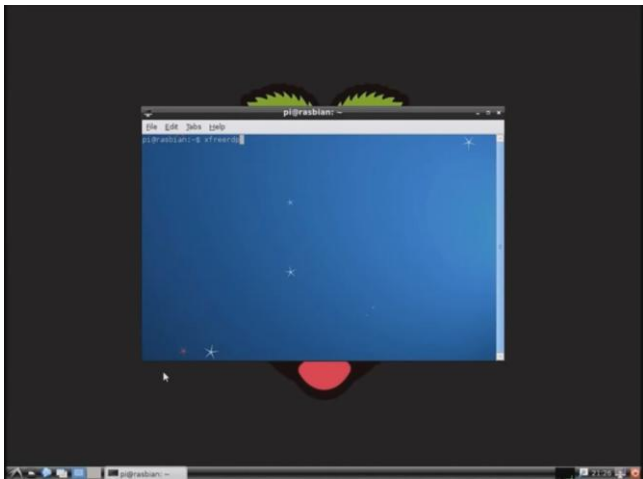


Figure 2. FreeRDP on Raspbian

III. MICROSOFT RDS

Remote Desktop Services accelerates and extends desktop and application deployments to any device, improving remote worker efficiency, while helping to keep critical intellectual property secure and simplify regulatory compliance. Remote Desktop Services enables virtual desktop infrastructure (VDI), session-based desktops, and applications, allowing users to work anywhere.[3]

1.4 Color Depth

With the release of Windows Vista, new user interface (UI) effects and practices that were previously uncommon scenarios for Terminal Services have been introduced. Applications that utilize the new Windows® Aero® desktop experience feature, including the desktop shell, Internet Explorer, and Microsoft Office 2007, use the alpha channel to render transparency/translucent effects. It is expected that many third-party applications will transition to using the same visual effects that are available in Windows Aero. To enable the full fidelity of the user interface of Windows Vista, RDP has added support for 32-bit color depth. To make 32-bit presentation virtualization more efficient, a new compressor for 32-bit bitmaps has also been added. Our internal test results below demonstrate that 32-bit presentation virtualization performs much better than 24-bit.[4]

Table 1 and Chart 1 compare the bandwidth (in kilobytes per second [KBps]) consumed by a user scenario that uses different color depth settings. The tests were conducted by using a 56-Kbps modem

connection setting with the default bulk compression settings.[4]

Table 1: Color depth comparison at different bit rates

User scenario	32-bit	16-bit	15-bit	8-bit
Executive PPT	119.4	122.6	108.8	51.2
Simple PPT	56.8	50.5	45.3	20.2
Typing and Scrolling	20.2	2.8	2.8	1.7
Scrolling	2.2	0.9	0.9	0.7
Internet Explorer	90.47	19.71	20.84	4.79

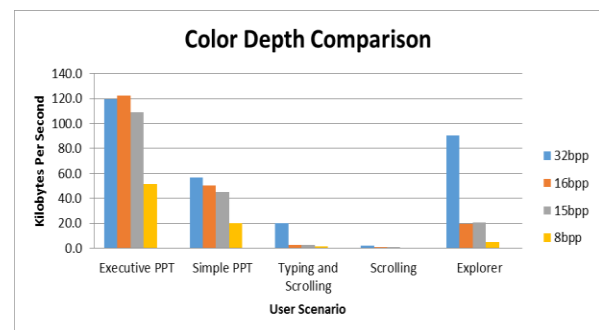


Chart 1: Color depth comparison for different scenarios[4]

1.5 Bandwidth Usage

This Chart shows the Bandwidth usage of the Protocol.

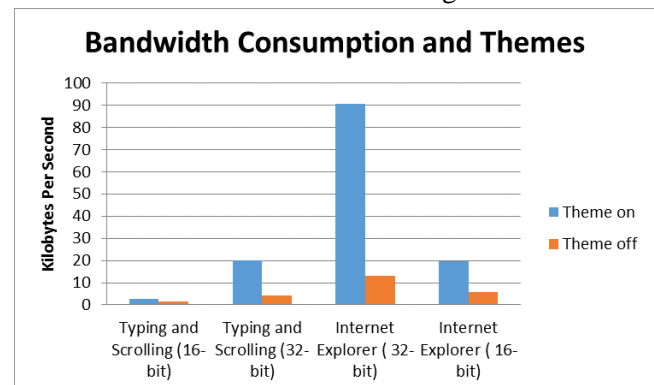


Chart 2: Bandwidth consumption at different color depths with and without themes enabled[4]

IV. ACKNOWLEDGMENTS

Our thanks to Microsoft for using the Remote Desktop Protocol, Raspberry Pi Foundation and Raspbian and freeRDP team.

V. FUTURE SCOPE

As we advance we can include USB Redirection that is not supported currently and can implement Printer Redirection.

VI. CONCLUSION.

This is an unconventional thin client made from Raspberry Pi 2 and a Windows Server.

REFERENCES

- [1] A Comparison of Thin-Client Computing Architectures, Technical Report CUCS-022-00, November 2000, Jason Nieh, S. Jae Yang, Naomi Novik, Network Computing Laboratory, Columbia UniversityDing, W. and Marchionini, G. 1997. *A Study on Video Browsing Strategies*. Technical Report. University of Maryland at College Park.
- [2] <https://www.raspberrypi.org/products/raspberry-pi-2-model-b/>.
- [3] <https://technet.microsoft.com/en-us/library/hh831447.aspx>.
- [4] Remote Desktop Protocol Performance, White Paper, 10/13/2008.
- [5] <http://www.raspbian.org/FrontPage>.
- [6] <http://www.freerdp.com>