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Less is More

Re-inventing the desktop

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Introduction

- The real cost of deploying personal computers in a networked environment
 - The network terminal alternative
 - How schools, governments, and businesses large and small can capitalize on this paradigm shift
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The Personal Computer Model

- All programs, data, and processing in one box.
- Each box is autonomous
 - updates, backups, repairs
 - must be maintained individually
- Every PC is a cheap server



I can get a PC for less than \$500USD

- The purchase price of PCs has decreased dramatically – but has the cost?
 - Each PC is identical at only one point in time – when the hard drive is imaged.
 - Since each PC stores its own copy of its operating system, programs, and in many cases user data, there is a nonzero cost to maintain its operation before its end of life.
 - And, the hardware required to store and run these programs locally has a short lifespan
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The Network Terminal Model

- All programs, data, and processing are on a server
- Each box is anonymous
 - provides input/output only
 - no maintenance required
- Sometimes a terminal is just a terminal...



So there's no hard drive. So what?

- No hard drive = no locally stored OS, programs, or data
 - Terminal OS and configuration remains on the server
 - All user data is on the server: backup the server and all user data is backed up
 - Most applications run on the server: update software on the server and the network is updated, programs utilize the powerful server processing power and run faster
 - A \$250USD terminal has a total cost not much higher...
 - No moving parts = high reliability, low power
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From Terminal to PC...

- The shift from “Mainframe” to “PC” was driven by:
 - The inability for the hardware at the time to push graphic media across the network
 - A more immediate need for local processing power than for sharing files between computers
 - Ultimately, an increasing market for home computers
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Why haven't we shifted back?

- The overwhelming market dominance of PCs in the workplace
 - Two decades of education and development devoted to a “Personal Computer” OS
 - We've been waiting for a server-grade multi-user “mainframe” operating system that could present a user-friendly desktop and applications that run well in that environment
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Enter Linux and LTSP

- Linux – Developing since 1991, an open source multi-user OS, suitable for systems from server to desktop
- LTSP – The Linux Terminal Server Project – Developing since 1999, an open source project that enables a Linux server to boot terminals and provide them their OS and configuration



Does *LTSP* limit me to *Linux apps*?

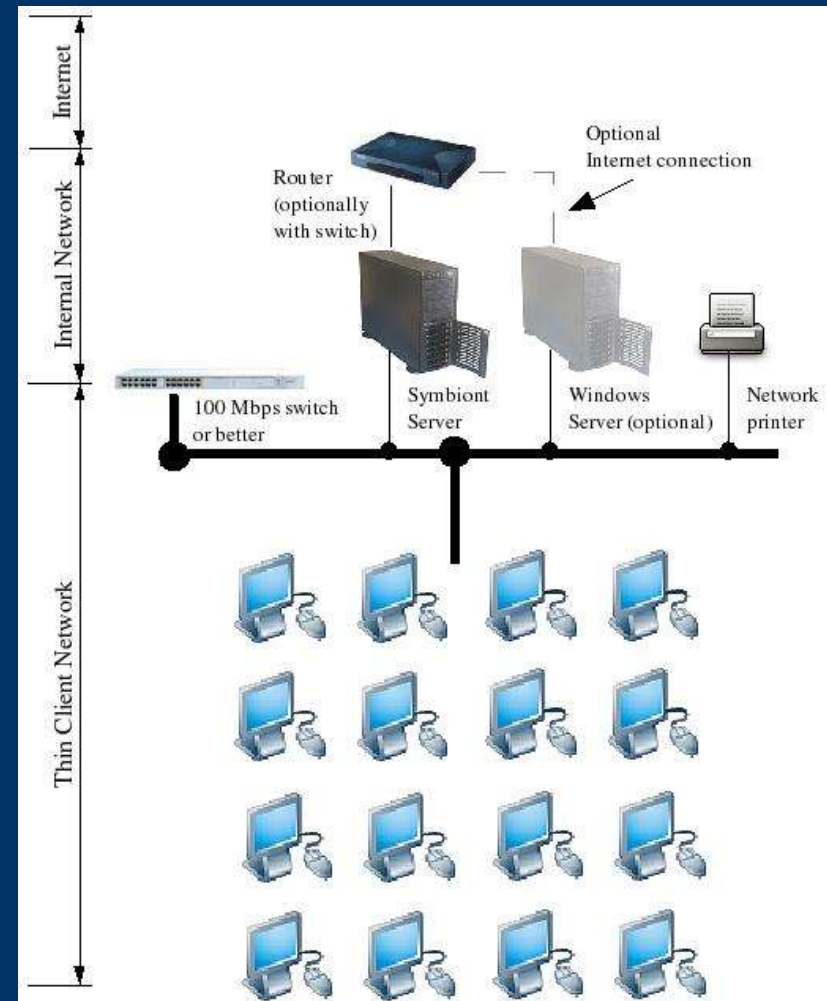
- Not at all, in fact with the right infrastructure it could expand the number of apps available
 - LTSP runs on a Linux server and boots the terminals, but it can connect the terminals to any terminal server or mainframe
 - Windows applications can be pushed through Windows Terminal Services or Citrix
 - Unix applications can be pushed through X
 - IBM 3270 and other terminal emulation connections can be made as well
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Do I need to buy special terminals?

- A terminal is very dumb, thus the hardware requirements are minimal
 - All of the following can be used:
 - Dedicated network terminal: typically no moving parts, silent, low power, small form factor
 - Some “thin clients”: Varies by manufacturer and difficult to refurbish
 - PC (as old as 486): 16 MB RAM, CPU > 66MHz recommended – not as reliable, energy efficient, or small
 - No vendor lock-in
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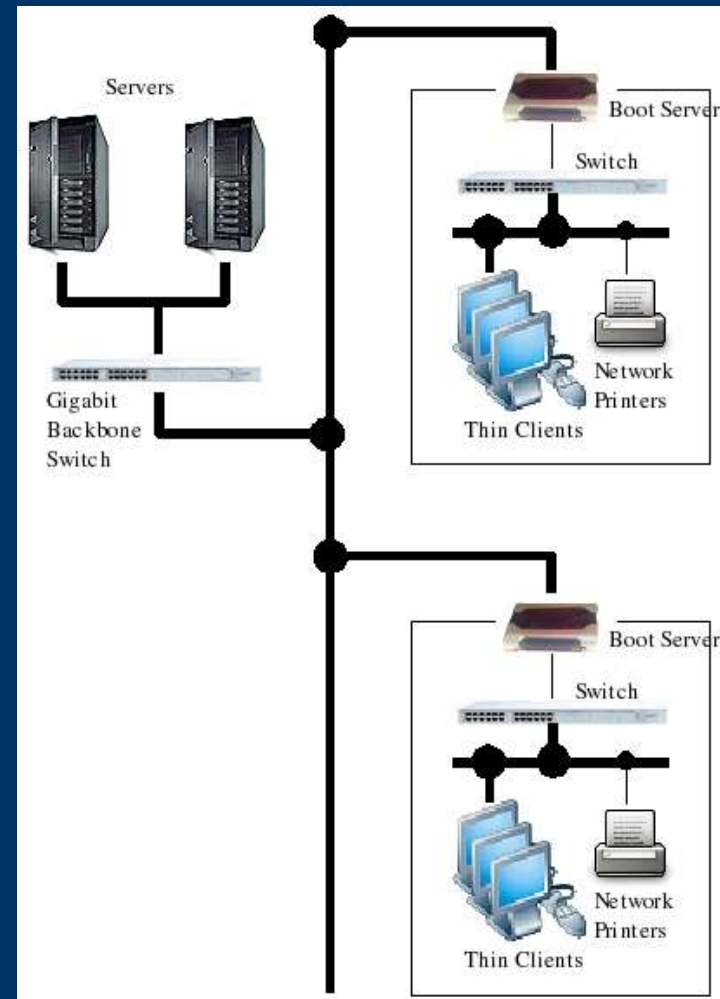
Small networks

- File storage, authentication, terminal booting, and application serving in a single server
- Easy to manage, update, backup, and maintain



Distributed Networks

- Centralized authentication, file storage, application servers
- Boot servers can be centralized or placed wherever routers would be placed
- Servers can be on-site or off-site, depending upon performance/maintenance needs



Who's making the shift to terminals?

- Hundreds of elementary schools, high schools, and universities around the world
 - IBM (internal deployments)
 - Exxon Mobil
 - Libraries
 - Government agencies
 - Cyber Cafes – Telecentros (Brazil)
 - Small businesses such as property managers, publishers, brokers...
 - You?
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Is there commercial support?

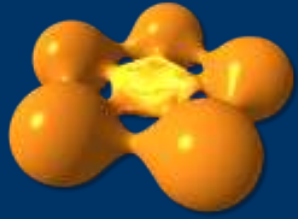
- Yes, and its growing
 - Symbio Technologies was formed in February, 2002 to contribute to LTSP and to develop commercial tools, hardware, and support to expedite its widespread adoption
 - The number of vendors producing terminals specifically for use with LTSP has grown by over 300% in the last 3 years
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Conclusion

- The convergence of Linux, high quality and high bandwidth network hardware, and low-cost commodity desktop hardware enables us to revisit practical and efficient network architectures
 - The result is a simpler, more manageable, high quality network architecture within reach of organizations large and small, rich and poor
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More Info

- www.TheSymbiont.com
 - www.LTSP.org
 - IRC (#tsp on irc.freenode.net)
 - www.K12LTSP.org
 - www.SkoleLinux.org
 - Probably, a 1979 Unix Admin Guide...
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Questions?

