



DIVISION OF ECONOMIC
& FINANCIAL STUDIES

VIRTUAL STUDENT LABORATORY

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BACKGROUND

- Macquarie University is basically a single campus institution, located at North Ryde in Sydney. It has approximately 31,000 students, and around 1,690 (FTE) staff.
- Central IT is responsible for core business processes, and general IT support for Divisions that do not have their own IT support facilities. Some large Divisions provide their own local IT support for teaching and research.
- The Division of Economic and Financial Studies is one of the largest teaching Divisions within the University with approximately 11,500 students, and 170 continuing fixed-term staff. It has a small IT section to support its teaching and research programs.
- The University has approximately 80 Student Computing Laboratories.

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VIRTUAL STUDENT LABORATORY

AIM

To enable students to remotely access student lab applications and data on any device, from any location, at any time.

CONCEPT

Take advantage of recent IT developments to virtualise our current Student Lab image, and deliver it to our students via a standard web browser.

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USER REQUIREMENTS

- Able to run from any device
- Able to run from any location
- No client is required to be loaded
- User experience must be intuitive
- User experience must be consistent
- No modifications required to applications
- All printing and file saving performed locally

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USER REQUIREMENTS (Cont.)

- Must be consistent with current lab look & feel
- Must be consistent with Division/University IT environment
- Must work with Netware 6.5 backend
- Must be cost advantageous/effective
- Require only native browser user interface
- Must be secure

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BENEFITS

- Students can undertake computing component of coursework without having to be on campus, and at any time from any location (including Internet cafes, if desired).
- Students can bring their own personal portable computers onto campus and take advantage of the University's wireless network to undertake the computing component of their coursework.
- Provides the ability to rationalise the various Student Computing Laboratories on campus, and reorganise them to maximise their efficiency, independently from the software applications which they support.

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CURRENT ISSUES

- **User Requirements**
 - No client is required to be loaded
 - User experience must be intuitive
 - User experience must be consistent
- **Software Licences**
 - Multiple User Licences
 - Server-Based Licences
 - Unlimited University-Based Licences
- **Performance & Scalability**

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ARCHITECTURE

- **Client Components**
 - Native Web Browser
 - Java Runtime Plug-In
- **Server Components**
 - Microsoft 2003 Server
 - VMware
 - Citrix Presentation Server 4.5
 - Citrix Secure Gateway & Web Interface
- **Authorisation & Delivery of Applications**
 - Novell eDirectory
 - Novell ZenWorks

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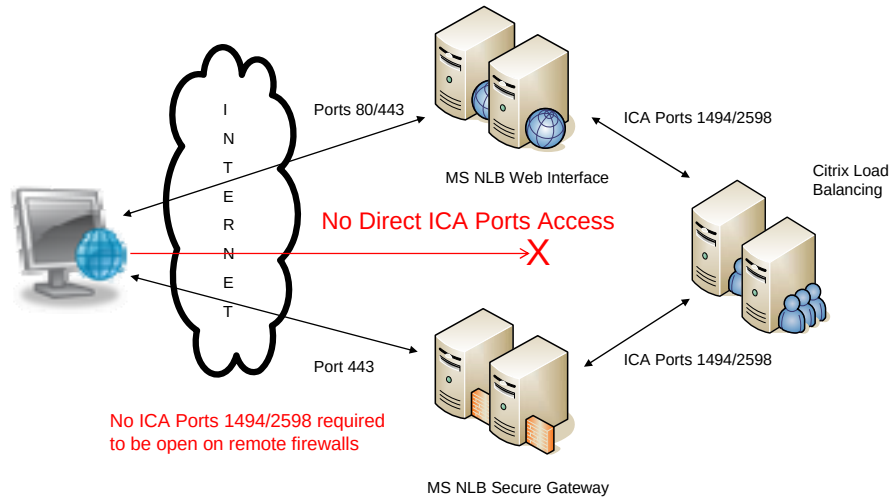
ADVANTAGES

- High availability. Built-in redundancy and load balancing.
- Based on JAVA and .NET technologies.
- Uses standard HTTP/HTTPS ports.
- Provides security. Traffic is encrypted within SSL/TLS.
- Does not expose the CPS servers IP address.
- Clients are platform independent.
(Users require only a standard web browser.)

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- Communications overview of the VLab components

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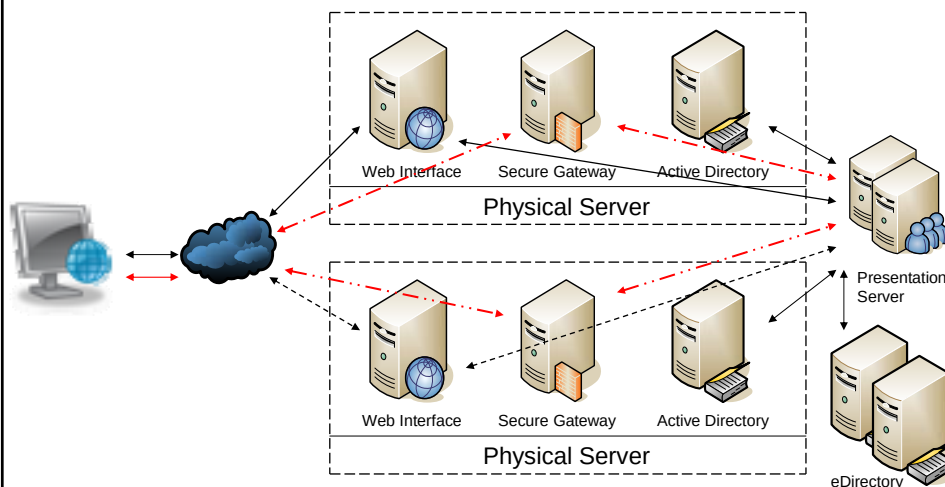
VMware Architecture

- VMware Infrastructure 3 – ESX
 - 2 physical servers
- Virtual Machines
 - 2 Citrix Web Interface Servers
 - 2 Citrix Secure Gateway Servers
 - 2 Microsoft Windows 2003 Servers running Active Directory Domain Controllers
 - One of each function running on a physical server
 - Web Interface and Secure Gateway running in a Network Load Balanced configuration

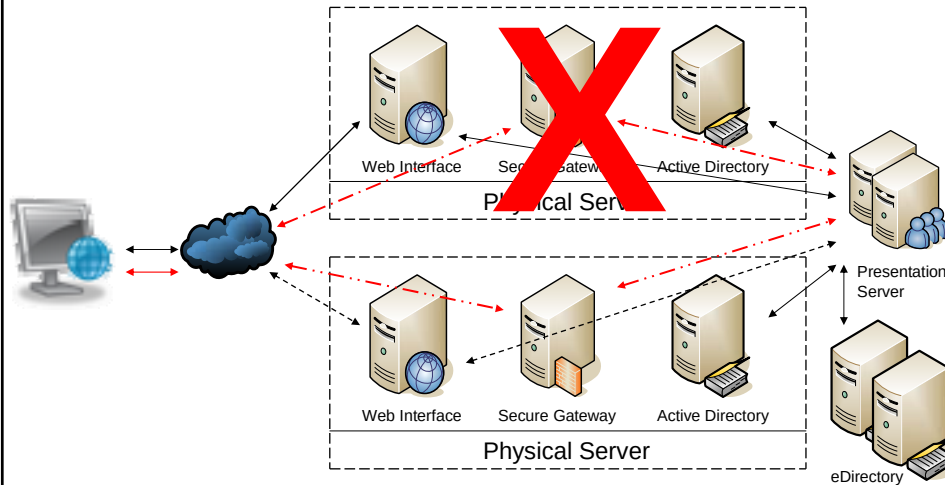
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So what does the virtual environment look like?

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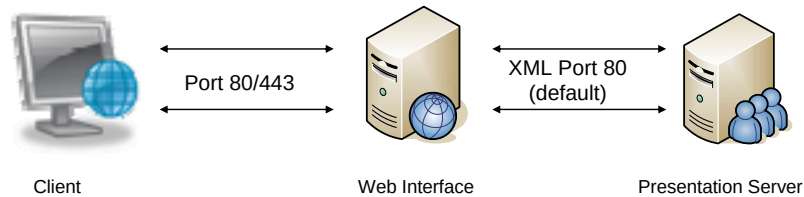
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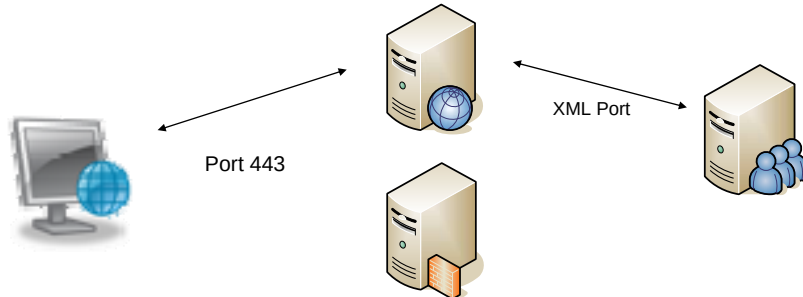
The basic steps behind the connection process

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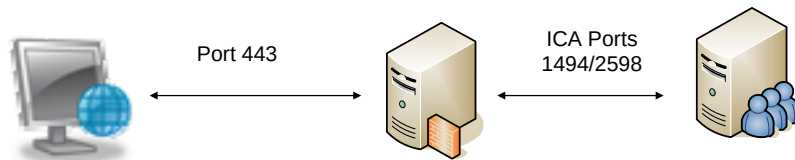
- User opens the URL (HTTP redirects to HTTPS), authenticates and is presented the list of published applications / desktop.
- All Internet traffic is HTTPS (Port 443)

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- The user clicks the icon
- An ICA file is created and downloaded
- The java client downloads if not previously cached
- The client receives the name of the Secure Gateway
- No further interaction with Web Interface, unless another application is launched

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- The ICA client encapsulates the ICA traffic into a SSL/TLS encrypted packet and sends it to the Secure Gateway
- The Secure Gateway terminates the SSL/TLS connection and decrypts the ICA traffic
- The Secure Gateway sends the ICA traffic to the Presentation Server
- All traffic now passes via the Secure Gateway, until the session is closed

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- Demonstration and Questions
- Thank You!