



Evaluating Virtualization for use in a Production Environment

Michael Baldauff

Staff (Automation) Engineer

FUJIFILM Diosynth Biotechnologies

12-06-2012

Evaluating Virtualization for use in a Production Environment

- Case study in evaluating whether to replace existing hardware on the FUJIFILM Diosynth Biotechnologies production system DCS with standard PCs and server hardware or move the installation to a virtual system.



FUJIFILM Diosynth Biotechnologies

A leading GMP Contract Manufacturing Organization for the biopharmaceutical industry.

FUJIFILM Diosynth Biotechnologies is an industry-leading biologics Contract Manufacturing Organization with locations in Research Triangle Park, North Carolina, USA, and Billingham, UK.



FUJIFILM Diosynth Biotechnologies

Recognized leaders in microbial-derived biologics, the two sites offer over 25 years' combined experience in the development and manufacture of recombinant proteins, vaccines and monoclonal antibodies, expressed in a wide array of microbial, mammalian and insect cell systems.

<http://fujifilmdiosynth.com>



History – FUJIFILM Diosynth Biotechnologies RTP

- 1996 - **Corning Biotech** – Installed **ABB** Advant MOD HP-UX (UNIX) Distributed Control System.
- 1997 - **Covance** : spun-off
- 2001 - **Akzo-Nobel** - Microsoft Windows XP Released
- 2005 - Upgrade from UNIX platform to Microsoft Windows Platform - **ABB** stops selling UNIX operator workstations.
- 2006 - Start **ABB** Upgrade to Windows XP



History – FUJIFILM Diosynth Biotechnologies RTP

- 2008 - **Schering-Plough** – acquires Diosynth from Akzo-Nobel
- 2009 - **Merck** merges with Schering-Plough
- 2010 - Sales of Microsoft Windows XP ended – October/2010
- 2011 - **FUJIFILM** acquires Merck Biomanufacturing Network
- Today - Servers are 7 years old, some parts are no longer available.
- 2014 - Extended Support for Microsoft Windows XP end - No more security updates



DCS TIMELINE

1 9 9 6	1 9 9 7	1 9 9 8	1 9 9 9	2 0 0 0	2 0 0 1	2 0 0 2	2 0 0 3	2 0 0 4	2 0 0 5	2 0 0 6	2 0 0 7	2 0 0 8	2 0 0 9	2 0 1 0	2 0 1 1	2 0 1 2	2 0 1 3	2 0 1 4	2 0 1 5
U N I X					X P				U N I X	X P				X P			V I R T U A L I Z E X P	X P	N O X P
I N S T A L L E D					I N T R O D U C E D				S A L E S E N D	A B B U P G R A D E				S A L E S E N D			E	S U P P O R T E N D	S U P P O R T



How is the DCS used?

- Used from Fermentation to Cell culture through Purification.
- Automated CIP, SIP in Fermentation, Cell Culture, Buffer Preparation, Media Preparation and Purification Areas.
- Clean Utilities Distribution and Monitoring.
- Critical infrastructure monitoring.
- Environmental Chamber Monitoring



Standard Problem

- Some hardware on the plant DCS system is 7 years old and will no longer supported by the manufacturer in the future.
- The vendor operating software is currently running on Windows 2003 Server and with Windows XP operator stations.
- Hardware being produced by the major manufacturers can still be purchased, but within the year may no longer be available.

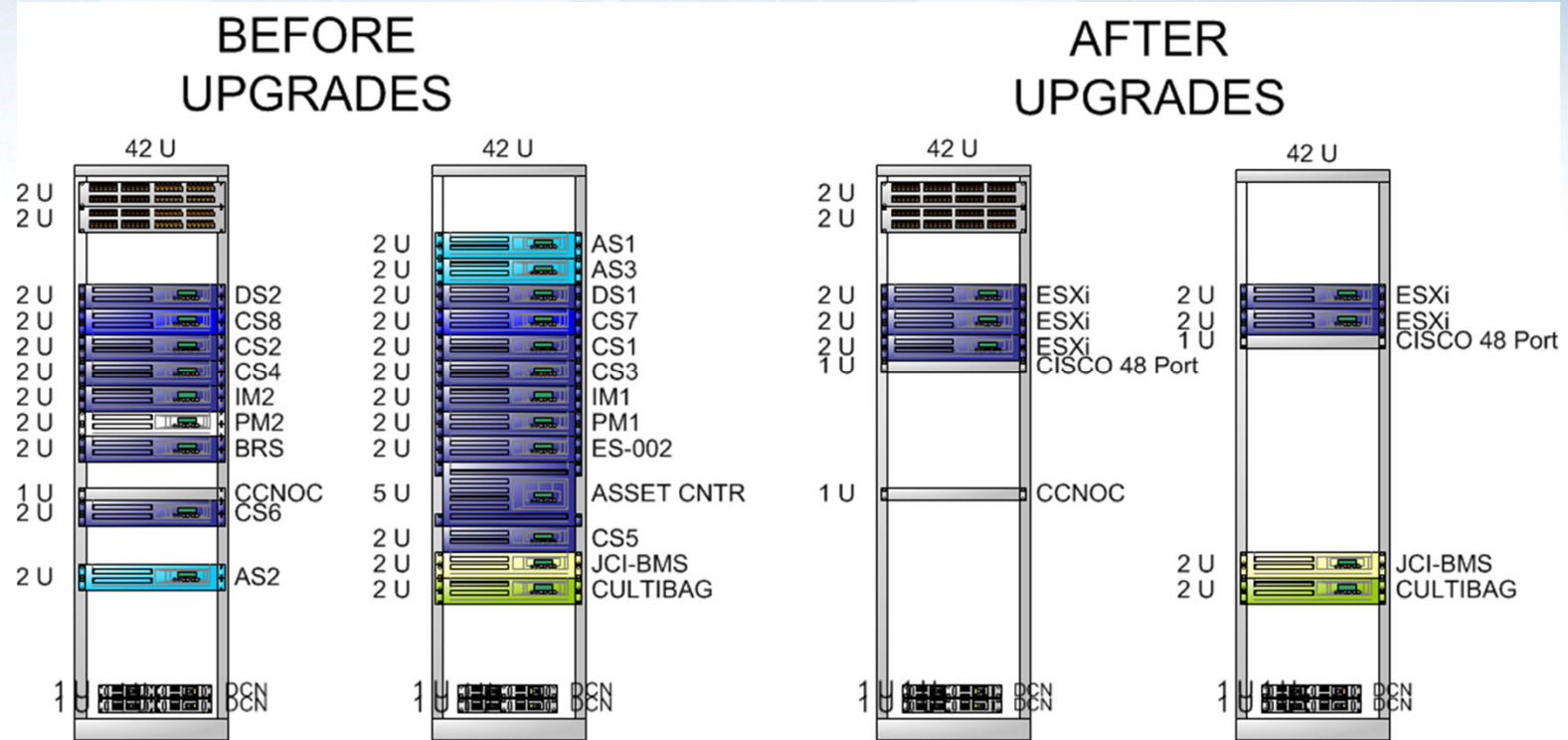


Virtual Solution

- Purchasing a new set of hardware at its end of life will allow us to extend the system life another 5-7 years, but where do we go from there?
- Upgrading to Windows 2008 Server and Windows 7 requires that our DCS graphics be redeveloped using PG2 graphics which moves us away from Visual Basic.
- Moving to a virtual environment allows us to escape from the hardware dependencies of Windows XP and 2003 server.



Proposed Virtualization Project



Legacy Systems

- In 2005 HP discontinued sales of its HP-UX 10.20 B2600 workstations which were the last model supported by ABB to run the ABB Advant MOD DCS system.
- In 2012 we are now looking at obsolescence of Windows XP and Windows 2003 Server hardware.
- Does hardware dependence ever end?
- How can we avoid this in the future?
- Why should this be avoided?



Legacy System Cost

- To upgrade to the ABB 800xa Windows from HP-UX platform will cost about \$3 MM.
- To upgrade from Windows 2003 Server and Windows XP will cost about \$1 MM, because of redevelopment and qualification costs.
- Moving to the virtual world should roughly be the same cost and could provide relatively hardware independent operation for the next 10 years.



System Considerations

- Does the vendor hardware and software support Virtualization?
- The answer was not direct, and took a few weeks to determine because vendor documentation does not fully cover all topics completely. This is a relatively new technology to be used in a production control system. Not widely accepted.
- A meeting held with knowledgeable ABB personnel helped drive the decision to go fully virtual.



Advantages: Virtualization

- Backup of some systems are easier.
- Restoration of a server takes minutes in some cases.
- Test systems are easier to build.
- Virtual servers are hardware independent and portable.
- Lower Power consumption.
- Smaller footprint.
- Easier to administer/remote.
- Higher uptime diversity.
- Systems that have a roaming profile can be quickly rebuilt in disaster situations.



Disadvantages: Virtualization

- Hardware/Software License Cost is more expensive.
- Unknown compatibility issues/fewer implementations.
- Additional training needed for support personnel.
- More Complex.
- Will virus protection software protect the infrastructure with extended support for XP ending in 2014 and Server 2003 support ending in 2015?
- Will printer drivers still work?



References:

<http://windows.microsoft.com/en-US/windows/history>

http://en.wikipedia.org/wiki/History_of_Microsoft_Windows

<http://windows.microsoft.com/en-US/windows/products/lifecycle>

<http://fujifilmindiosynth.com>

