



## Overview

How and why Marist college:

- I. Reduce their operational costs
- II. Manage their estate with minimal resources
- III. Reduce their time to deploy
- IV. Deliver unique projects and solutions e.g. virtual server deployment
- V. Relevance and future of zEnterprise in Higher Education
- VI. Vast range of solutions delivered on zEnterprise and Why
- VII. Competitive advantage



# Marist College

## A Higher Ed Enterprise on the z

Presented by

Bill Thirsk

*Vice President of Information Technology/CIO*

Harry Williams

*Chief Technology Officer*

October 18, 2012



## Collaborative Partnerships

- Marist has a long history of creating and building strong partnerships
  - Offers students, faculty, and staff the ability to collaborate with business leaders
  - Provides unique learning opportunities for students
  - Allows the College to extend academic outreach programs to the local business community
  - Promotes the development of applied research projects
    - ✓ Successful projects are used to maintain day-to-day operations

**CDW-G**  
The Right Technology. Right Away.™

Higher Education Solutions • JANUARY 2007

New twists on server virtualization are helping campuses maximize their IT resources.  
BY JOHN BURTON

# Virtually Perfect

The virtualization of servers offers cost savings and increased efficiency. Although virtualization can solve many management and resource challenges, IT experts recommend taking different approaches, depending on a campus's project needs, hardware makeup and appetite for server experimentation. While not the answer to all such as potential security breaches easy to remedy, according to many IT professionals. The term "virtualization" refers to the features and functions on logical rather than also a factor in determining what strategy to take. The concept of virtualization is not new. For decades, virtualization has been done on mainframes. Using software, the mainframe is segmented into two or more segments, with each segment being apportioned to a different user. Increasingly, campuses are implementing another variation on virtualization, in which a single application or process is distributed across many machines in grid computing arrays. Another popular approach is to mimic the mainframe scheme with multiple server instances running on a single hardware box. However, instead of large, expensive mainframes, the hardware box in question is an inexpensive, commoditized machine.

**KEEPING UP TO SPEED**  
Virtualization enables software upgrades and security patches to be run very quickly, says Harry Williams, Director of Technology at Marist College.

# Virtual Reality

Marist College finds cost and space savings through server virtualization.

Harry Williams  
Director of Technology and Systems  
Marist College  
Poughkeepsie, NY

**IN THIS ISSUE**  
Consolidation: Improve Efficiency, Maximize Resources  
Page 4  
Content Management: Keep Data Under Control  
Page 16  
Security: Your Desktop Computers  
Page 18

<b>IBM® BladeCenter® H21 Server</b> Dual-Core x86™ Server™ Processor 1700 \$1,499.00 CALL FOR PRICING CDW 1113819 Chicago, Illinois	<b>HP® Smart UPS™ 1300VA USB &amp; Serial PM 20 120V</b> Performance grade protection for servers and other 2004 servers \$463.31 CDW 449725 Page 17	<b>VMware® Infrastructure 3</b> Provides built-in management and resource optimization CALL FOR PRICING CDW 119482 Page 18
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## Collaborative Partnerships (continued)

- **Datatel + SGHE merger announced 01/23/12**
  - **Marketing relied on strong customer-based partnerships**





## Collaborative Partnerships (continued)

The screenshot shows the IBM Smarter Planet website. The browser address bar displays the URL: [www.ibm.com/smarterplanet/us/en/index.html?csr=agus\\_brepsmplanet-20110818&cm=k&cr=google&ct=USBRB301&S\\_TACT=USBRB301&ck=ibm&cmp=USBRB&mkwid=sxFciEfb1\\_12940040387\\_432h](http://www.ibm.com/smarterplanet/us/en/index.html?csr=agus_brepsmplanet-20110818&cm=k&cr=google&ct=USBRB301&S_TACT=USBRB301&ck=ibm&cmp=USBRB&mkwid=sxFciEfb1_12940040387_432h). The navigation menu includes: Solutions, Services, Products, Support & downloads, My IBM, and a Search bar. The main content area features two testimonials:

**Bill Thirsk | Vice President of Information Technology & CIO, Marist College**  
“ This is a place holder for future text that might be more than one sentence long. It could even be three or four sentences. We dont know yet.”

**Harry Williams | Chief Technology Officer, Marist College**  
“ This is a place holder for future text that might be more than one sentence long. It could even be three or four sentences. We dont know yet.”

The **MARIST** logo is positioned at the bottom right of the testimonial section.

Below the testimonials are three featured content blocks:

- Human ingenuity and the art of research**  
Making discoveries that shape science, business, academia and society >
- Smarter cities**  
Creating an instant city for 70,000 fans: watch the video
- Sustainability**  
How businesses gain by reducing  
Having a positive effect on the planet can mean a positive bottom line >

A Feedback icon is located at the bottom right of the page.



## Collaborative Partnerships (continued)

“In coordination with and with support by Marist College, we have added the z114 to our supported platform portfolio. Providing more customer choice and flexibility is consistent with our Open Digital Campus strategy. Our strong, long-standing relationship with IBM, which includes designating the IBM System p / AIX as a SunGard Higher Education supported platform, continues to help institutions of higher education succeed.”

- Darren Wesemann, Senior Vice President & CTO, Ellucian (formerly SunGard Higher Education)



## Marist College Mission Statement

***“Marist is dedicated to helping students develop the intellect, character, and skills required for enlightened, ethical, and productive lives in the global community of the 21<sup>st</sup> century”***

*(Marist Strategic Plan 2011-2016: Leadership and Innovation for a Changing World, pg. 3)*



## Marist Profile

- Official State Charter Granted in 1946
- Total student population: 6,303
  - 4,536 traditional undergraduate students
  - 569 adult education students
  - 872 full- and part-time graduate students
  - 650 non-matriculated students at Florence branch campus
- 43 Bachelor's programs
- 12 Master's programs
  - Fully Online MBA, MPA , MS/IS, and MA in Communication
- 22 Certificate programs
- Extension sites throughout NY
- Branch campus in Florence, Italy
  - Freshman Florence Experience
  - Semester Study Abroad
  - Four-year Bachelor's Program
  - Master's in Museum Studies





## Leadership in Technology

*“A distinguishing feature of the Marist education is the manner in which information technology is used to support teaching, learning, and scholarship. The College, a leader in educational applications of information technology, offers students access to advanced technologies to help them develop as lifelong learners and productive members of their communities.”*

*(Marist Strategic Plan 2011-2016: Leadership and Innovation for a Changing World, pg. 4)*



## Leadership in Technology (continued)

➤ **Ranked #8 in Northern region by *U.S. News & World Report***

- **First time Marist cracked the top 10 – longtime goal**

➤ Princeton Review's *Best 377 Colleges*

- Top 20 in international education
  - ✓ Cites our “beautiful campus on the Hudson”

➤ Princeton Review's *Best 294 Business Schools*

- Lists the AACSB-accredited School of Management

➤ *U.S. News & World Report*

- Ranked online MBA and online Liberal Studies BA/BS nationally
- Marist was 5<sup>th</sup> in selectivity and 6<sup>th</sup> in faculty credentials

➤ Hancock Center profiled in *University Business*

➤ *Kiplinger's Personal Finance* released list of best values in private colleges and universities

- Marist was #38 for second year in a row





## Leadership in Technology (continued)

- Internet2 and NYSERNet Research Institution
- Winner of 2008 Innovation Award
  - New York System zLinux Executive Customer Council
- Winner of NACUBO 2010 Innovation Award
  - Applied Research
  - Banner on the z
- Project Challenge 2010 - Invitation
  - Lumina Education Foundation Award
  - Baldrige Quality In Higher Education
    - ✓ IT Self-Study, Assessment, and Continuous Improvement
- Winner of 2012 Luminis Idol
  - myMarist on Luminis Platform 5
- Winner of National Consortium of Continuous Improvement in Higher Education 2012 Leveraging Excellence Award





## Building on Systems and Continuing Infrastructure

- Reasons for Intelligent Risk
  - Strong Joint Study partnerships in high performance computing
    - ✓ Leadership position with the Enterprise Computing Community (ECC) funded by National Science Foundation (NSF)
    - ✓ Valuable student / faculty / staff / research heritage
  - Previous successes provided confidence for future innovative deployments / projects
    - ✓ Successful enterprise implementation of the Sakai Community Source Collaborative Learning Environment (CLE)
      - Fully integrated with campus systems
      - Modified to run on high performance and high efficiency platform
  - Proven experience in high-end technical support
    - ✓ Leadership role in the development and roll-out of Linux on System z in partnership with IBM
    - ✓ Provided support to multiple colleges and organizations



## Building on Systems and Continuing Infrastructure (continued)

- Why Banner on System z? - The offer Ellucian (SunGard+Datatel) didn't refuse
  - Avoid considerable capital and operating costs
    - ✓ Use of existing infrastructure
      - Avoided at least \$300K in single purpose server hardware to run recommended Banner configurations
    - ✓ Existing expertise on platform was utilized, avoiding training costs
      - Long history of innovative use of mainframe services to support academic experience
      - For 20 years we ran IA Plus on CICS on z/OS
      - Extensive knowledge of System z, z/VM, Linux on z
      - Marist produced first Linux on System z distribution
    - ✓ Use of virtualization to provide many services with few resources has always been priority
      - Limited physical space in Data Center
      - Limited hardware and environmentals (power, cabling, cooling, racks, etc.)
      - Limited number of staff needed to control large number of services



## Building on Systems and Continuing Infrastructure (continued)

- Cost Comparison
  - Doing an “apple to apple comparison,” the z financially outperforms other platforms if we had to move from the z to other platforms
    - ✓ Sustainability – Total Cost of Energy
    - ✓ Footprint – Smaller data center
    - ✓ Manageability – Equal or less than a distributed UNIX shop
    - ✓ Currency – Training costs are less than major network providers
    - ✓ Connectability – One network in, one network out
  
- Even as a medium-sized institution, Marist realizes significant operational savings by centralizing our operations on the z



## Enterprise on the z

### *Operational Data Center*

- Modern Server Environment
  - Two System z “mainframes” running z/OS, z/VM, Linux for z
  - 11 System p servers running AIX and Red Hat Linux
  - Intel-based Linux & Windows 2003/2008 Servers
  - 156 Traditional Servers
  - 955+ Virtual Servers
  
- 125 Terabytes State-of-the-Art IBM storage
  
- DB2, Content Manager, and ERP systems
  - First to run Ellucian Banner on Linux on System p
  - First to run Ellucian Banner on System z
  
- NACUBO Innovation Award 2010



# MARIST

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## Awards and Publications

➤ *Since 2007, Marist has appeared and been featured in over twenty-nine (29) major trade publications in the higher education industry for its technology leadership*



➤ *Recognized with numerous awards for technology management excellence and innovation by outside organizations*

- *zLinux Executive Council*
- *Government and Education Alliance*
- *Lenovo*
- *Sakai Foundation*
- *Assistive Technology Industry Association*
- *New York State Disability Services Council's Campus Access Award Nomination*
- *Ellucian*
- *NACUBO*
- *NCCI 2012 Leveraging Excellence Award*

➤ *Marist ranked 35th in the Nation for Social Networking*







## Hancock Enterprise Computing Research Laboratory

### CAMPUS TECHNOLOGY

HPC | News

#### Marist College Beefs Up HPC with IBM z114 Hybrid Mainframe

- By Dian Schaffhauser
- 01/17/12

Marist College in Poughkeepsie, NY is expanding its high-performance computing capabilities with a new hybrid computing system from IBM for AIX and Linux applications.

The latest computer installation comes courtesy of a \$680,000 grant from the National Science Foundation's Major Research Instrumentation Program to Marist's School of Computer Science and Mathematics. Marist College, which has 5,350 students, has been doing high-performance computing work with IBM since 1988, when the two organizations set up a joint study arrangement. Under the partnership, the school's community works with IBM research and development staff on emerging technology initiatives. That includes IBM involvement in the Marist College Institute for Data Center Professionals, which delivers training on enterprise computing.





## Enterprise Level System for Research / Research Training

- Primary areas identified for requested enterprise system
  - Research on the system architecture and software itself
  - Research applications that will benefit from greater storage capacity and/or faster processor speed
  - Applied collaborative research between faculty and industry
  - Research training for faculty and students at Marist and other universities
  
- Research areas selected after consultation with
  - Marist faculty from the School of Computer Science and Mathematics and research partners at other universities
  - Co-PIs from partner universities in the Enterprise Computing Community (ECC), particularly
    - ✓ Illinois State University
    - ✓ North Carolina A&T State University
    - ✓ Widener University
    - ✓ University of Arkansas
    - ✓ Stephens Institute of Technology
  - IBM Corporation
  - Several industry partners in the ECC
  - Juniper and Brocade (for network research)



Enterprise Computing Community



## z114 zBX Research – Approved Projects

Researcher	Organization	Basic Premise	Environment	Status	Type
Matt Glomski & Matt Johnson	Marist	Improve performance and degree of accuracy on infectious disease research	C++ on AIX on pBlade	Complete – Successfully obtained desired precision (inhomogeneous planar Benard problem)	Compute Intensive
Pankaj Srivastava	IBM	Analysis of IBM sales data. Coverage Optimization with Profitability	DB2 on Linux on z	Complete – 6.7x speed increase	Compute Intensive
Kerri-Ann Norton	John's Hopkins University	Cancer research using MatLab	Windows on xBlade	Beginning	Compute Intensive
Eitel Laruia & Josh Baron	Marist	Open Academic Analytics Initiative to predict student success in online courses (Gates Foundation Grant)	Windows on xBlade, SPSS modeler	In Progress	Analytics
Gary Littlefield	IBM	Predictive Analytics to identify invalid SW defect reports	Cognos and DB2 on Linux on z and SPSS modeler on Windows on xBlade	In progress – Upgraded Cognos to 10.1	Analytics
Eitel Lauria	Marist	Evaluate Cognos Express environment for course use	Cognos Express Windows on xBlade	In Progress	Analytics
Ron Coleman	Marist	Improve performance and multiprocessing capability of financial analysis application (written in SCALA)	SCALA Linux on xBlade/ DB Linux on z	In Progress – DB2 4x faster than Mongoddb on mainframe	Performance Analysis
Casimer DeCusatis	IBM	OpenFlow Network compliance testing. Running controller on zBX blades. Controlling top of the rack switch through zBX controller, with failover controllers.	Linux on xBlade	Building	Performance Analysis
Prof. Chu Jong	Illinois State University	Investigate cross-platform Workload Management on zEnterprise	Linpack on Linux on z. Up to 128 Linux guests on z/vm.	Building	Performance Analysis
Raj Krishnamurthy	IBM	Convert bond portfolio app to OpenCL environment (See Ron Coleman)	Multiplatform comparisons	Beginning	Performance Analysis
Scott Frank & Ron Coleman	Marist	Improve speed and degree of accuracy on seismic wave propagation research	Fortran on Linux on xBlade	In Progress – Increased number of application instances which can be run at once and faster turn around	Simulations
Howard Baker	IBM/Marist	Installing Virtual Computing Lab environment on zBX	xCAT on Linux on xBlade	Building	Cluster Management
Nate Gaffeny	IBM	Tivoli Monitoring beta test site	Tivoli on Linux on xBlade	Complete	Monitoring
Peter Yocum & Matt Johnson	IBM/Marist	Exploit new APIs in zEnterprise Universal Resource Manager microcode. Visualize results in new user/browser interface. zSentinel.	Python scripts utilizing URM APIS on xBlade	Prototype Complete	Monitoring



BILL & MELINDA  
GATES foundation

## Open Academic Analytics Initiative (OAAI)

- **Grant (\$250k) from the Bill & Melinda Gates Foundation and administered by EDUCAUSE Next Generation Learning Challenges (NGLC) program**
- **OAAI Goal:** Develop and deploy open-source Learning Analytics “early alert” system
  - Designed to predict, within first 3 weeks, which students are “at risk” of not completing their courses
  - Uses open-source Sakai and the Penatho Business Intelligence (BI) tools, as well as SPSS Modeler
  - Hosted in Marist’s Enterprise Computing Research Lab (z114)
  - Marist is lead working with six partners and in collaboration with IBM
    - ✓ Marist Academic Technology and eLearning Office (IT) and Marist Research Computing Office (IT)
- Research agenda is focused on two primary areas
  - **Portability of predictive models** – can models be designed to work in different academic settings
  - **Intervention strategies** – what intervention strategies are most effective in improving outcomes



## Open Academic Analytics Initiative (OAAI) (continued)

### Project Summary To Date

- Developed OAAI Predictive Model based on Marist student and Sakai usage data
- Successfully deployed Sakai-based Learning Analytics solution during Spring 2012
- Produced Academic Alert Reports for 32 courses at 3 institutions (1,000+ students)

### Marist Research Team Findings (Dr. Eitel Lauria, Dr. Erik Moody, Graduate Students)

- Accuracy of predictive model remained largely intact when ported to community colleges and Historically Black College and Universities (HBCUs)
  - OAAI predictive model was in the 86 - 87% range when tested at Marist
  - Mode was in the 75% - 79% range when deployed at partner institutions
- Found a statically significant difference between average course grades when comparing students in our two treatment groups to our controls
- Initial findings published in peer-reviewed conference proceedings
  - *Mining Academic Data to Improve College Student Retention: An Open Source Perspective*



## Projects and Partners

### *Marist Institute for Public Opinion (MIPO)*

- Nationally Recognized Center Founded in 1978
- Provides Scientific Surveys
  - Elections
  - Policy issues
  - Human interest topics for the public
- Provides Unique Student Educational Opportunities
- Exploring Innovative Internet Survey Techniques
- State of Art Predictive Dialing





## Projects and Partners (continued)



FRANKLIN D. ROOSEVELT  
PRESIDENTIAL LIBRARY *and* MUSEUM

### *FDR Presidential Library and Museum*

#### ➤ **Digitize and “Web Publish” FDR Library’s Holdings**

- Includes President’s Secretary Files
- Key documents sought after by researchers
- Extensive photographic holdings

#### ➤ **National Showcase For IBM’s Digital Library Technologies**

- First presidential library with original holdings online

#### ➤ **Digitization Of Primary Source Material Continues**

- Roosevelt Churchill correspondence
- Eleanor Roosevelt’s “My Day” newspaper columns
- Former Secretary of Treasury, Henry Morgenthau’s diaries under consideration
- Education Programs for K-12 Teachers and Students



## Projects and Partners (continued)

### *The Hudson River Valley Institute*

**Academic Center Devoted to Education, Research, and Publication of Information on the Hudson River Valley, a National Heritage Area**

➤ **Web Site Hosting**



➤ **Developing**

- Digital Archives
- Regional Portal Site
- New Undergraduate Curricula
- Interdisciplinary Internships
- Education Programs for K-12 Teachers and Students





## Projects and Partners (continued)

### *Lowell Thomas Archives Image Collection*

#### ➤ **Digitize and “Web Publish” Marist Library’s Lowell Thomas Collection**

- *Lowell Thomas Collection consists of photographs, audio recordings, motion pictures, artifacts, and over one million pages of manuscript materials*
- *Materials dated from the period 1789 to 1984*
- *Initial implementation consists of thousands of photographic negatives, hand painted glass photographic images, and printed photographs*
- *Images stored in IBM’s Content Manager on z/OS*

The Lowell Thomas Papers contain over 36,000 images...

over 500 hours of film...

over 1,000 hours of audio...

and over 1,000,000 documents.



## The Joint Study

### *A Unique Research Partnership with IBM*

- IBM / Marist Partnership supports students of all disciplines throughout their academic career
- Marist participates in the IBM Value chain as both a contributor and as a consumer
  - Research
  - Teaching and Learning
  - Scalability of operations and efficiency
  - ISV 'lift and move' development, testing, and operations
- Original research projects started in 1988
- Our Return on Assets Model has been proven with massive virtualization and non-similar workloads



## The Joint Study (continued)

A Unique Research Partnership

- Collaborate with Marist, IBM experts, and industry partners on projects that support top technology trends (PoC and First-of-a-Kind projects) that are beneficial to all parties
- Provide Leadership, Guidance, and Support to the IBM Academic Initiative
  - Course development, faculty training, faculty research, student/faculty access to IBM hardware and software worldwide, and community development
- Support the IBM sales team through customer briefings and reference implementation of IBM technology
- Provide a pipeline of top students to IBM and IBM customers via internships
- Student Outcomes have persistently improved across all the schools at the College due to supporting technology infrastructure

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## The Joint Study (continued)

A Unique Research Partnership

\$50M



**1978:**  
First IBM  
Mainframe  
at Marist

**1981:**  
First  
Academic  
Collaboration  
with IBM  
*“College  
Writing on  
Computers”*

**1988:**  
Beginning of  
Joint Study  
Research  
Project

*“Use of a Large  
System by a  
Small  
Customer”*

**1994:**  
Automated  
Student  
Telephone  
Directory

*Beginning of  
integrating  
telephony while  
maintaining  
privacy*

**1994:**  
Marist College  
World Wide  
Web  
Served off S/390

*Integrating the  
mainframe into  
the distributed  
world*

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## The Joint Study (continued)

A Unique Research Partnership

**1995:**  
**MERIT –  
Electronic  
Reserve  
Room**

**1996:**  
**Development  
of New Digital  
Library**

*Multimedia  
and FDR  
Library*

**1999:**  
**Linux for S/390  
Distribution  
Download  
Hosted at  
Marist College**

**2000:**  
**First College to  
Develop a Linux  
R&D Lab**

*Development of  
Student Linux  
Servers*

**2002:**  
**Beginning of  
z/OS  
Knowledge  
Center at  
Marist**

*Course modules  
and support for  
student  
exercises*

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## The Joint Study (continued)

A Unique Research Partnership

\$150M

2010:  
Gemini Cloud

*The College began offering Private Cloud services at scale from the z*

2010:  
Cognos Rational Cloud / Virtual Computing Lab Project

*Pre-configured multi-tier Business Analytics Instructional System*

2009:  
WAS/DB2 Integration with Sakai Open Source CLE

2009:  
Banner on z  
*Higher Ed ERP launched on z*

2006:  
Join Sakai Foundation  
*Learning System for Greystone*



## The Joint Study (continued)

### A Unique Research Partnership

- Collaborative Activities
  - Multiple Research Projects
    - ✓ eLearning – K-12, Higher Ed - 2003 SUR Grant
    - ✓ Rich Media – Several collections – FDR, Emmy, Hudson River, Lowell Thomas
    - ✓ Open Source CLE Enablement - 2005 SUR Grant -Sakai
    - ✓ Linux Virtual Servers for Students
    - ✓ Grid Computing Apps
    - ✓ Cell-z Hybrid Environments and Virtual World Apps
    - ✓ Cloud Computing/Open Education Environment/SaaS – Greystone
    - ✓ Support of many NSF and NYSTAR activities with Marist
  - Primary School for z Academic Initiative
    - ✓ z/OS Knowledge Center – Primary AI Hub worldwide
    - ✓ Global model for z/OS course development and online course delivery
    - ✓ 23 new courses developed – many faculty awards
    - ✓ Strengthening Power and SWG AI activities
  - Extensive Sales Support
    - ✓ 20+ Presentations/Calls/Demo's with potential customers in last 18 months
    - ✓ 6+ interviews and articles by Marist faculty and CIO
  - Skill Pipeline
    - ✓ Since 2001 – 43 IBM/Marist Internships. Many hired by IBM and IBM top customers
  - Sakai
    - ✓ Integrating WAS and DB2 with Sakai
    - ✓ Made QA servers hosted by Marist, available to community
    - ✓ WAS and DB2 were officially supported in Sakai 2.6
    - ✓ State Bank of India adoption – 300,000 users!



## Success on System z

### *z/OS Knowledge Center on System z*

- Provides remote access to z/OS image for professors and students
- Knowledge usage as of May 2012
  - Over 745 courses have been taught
  - 696 professors
  - 250 schools worldwide, Lithuania to Queensland, Australia
- Over **11,494 Userids** issued for hands on education
- Steadily increasing number of professors and students
- Very high ratings and positive professor/student feedback for quality of service





## Success on System Z (continued)

### *Linux on System z*

#### ➤ Current Staffing

- Systems Programmer for z/VM, Hardware Support, and other duties
- Systems Programmer for Linux Development/Support, mostly z, some x86
- Server Administrator for Linux Support mostly x86, some z
- LDAP, Operations (Server Monitoring), Networking, etc. are handled by normal staffing



## Success on System Z (continued)

- Currently virtualized on z/VM
  - Webmail Interface to IMAP Using Horde
  - Banner Application Servers
  - General Web Server for all Faculty, Staff, and Students
  - A Wiki
  - IceCast – audio streaming server (encoding on Intel Server)
  - Test Servers for all server admin staff
  - Various projects for The Linux Foundation supporting Open Source development on System z (formerly Open Source Development Labs – OSDL)
  - Slackware for System z development
  - SysLog
  - Oracle Database Servers (at least 8)
  - LAMP Web Servers
    - ✓ Over 20 Different Servers in Production
    - ✓ Over 600 Servers for Students
    - ✓ Supports Student Government and Clubs
  - Sakai hosting for 14 K-12 school districts
- General Linux Server for Student Computer Society
- Test Servers for our Sakai Environment and Development
- Firewall for the other Linux Servers
- Subversion Server for all Marist Development
- NTP Server for Campus
- Central Authentication Server (CAS)
- Email Gateway Hub
- Main College Web Servers including Production and Test
- College Library Web Servers
- File Dropbox
- Web content management systems (OmniUpdate, WordPress)
- Xymon (Hobbit) monitor for servers and network devices
- Cognos Business Intelligence Infrastructure
- SPSS
- Jobs.Marist.Edu (Job Applicant Tracking)



## Success on System Z (continued)

### *Linux on System z*

#### ➤ Development Mainframe - z990

- Used for testing, development, and proof-of-concept projects
- Original part of OSDL project
- Debian and Slackware have servers for development work
- Hosts primary “git” server for Linux on System z (allows Open Source community to submit code for review and incorporation into Linux kernel)
- Hosts Marist student academic servers (>600 currently)
- Cognos
- SPSS
- Rational Servers



## Success on System Z (continued)

### *Linux on System z*

#### ➤ Student Academic Linux Servers

- Currently based on Marist Linux distribution
- Kernel and basic configuration files stored on shared, read/only disk (one copy shared among all servers)
- Servers each have individual read/write space for programs, additional software, etc.
- Students receive 1-5 servers depending on course requirements
- Students retain servers across academic career, use as a portfolio, and courses can build on work of pre-requisite courses
- Highly virtualized is only cost effective solution



## Success on System z (continued)

### *Cognos Cloud on System z and Virtual Computing Lab (VCL)*

*(Used to deliver fully online Business Intelligence Course)*

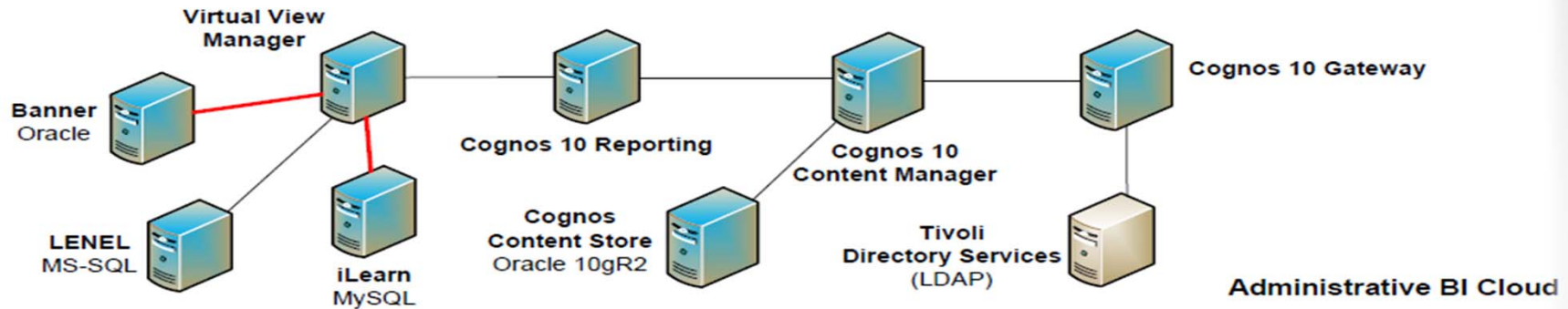
- Cognos Cloud on System z consists of the following
  - Cognos Framework Manager
  - Cognos TM1 Perspectives
  
- IBM DB2 Version 9.5 on System z used as the data warehouse
  
- IBM Tivoli Directory Services on System p used for authentication
  
- VCL used to provide desktop images for the students containing
  - Microsoft Windows 7
  - Microsoft Office 2007
  - Microsoft SQL Server 2008
  - Open-source data mining tools
  - DB2 Connect
  
- **Acted as a Cognos Hub for Universidad de Buenos Aries and Universidad de Belgrano, Argentina**



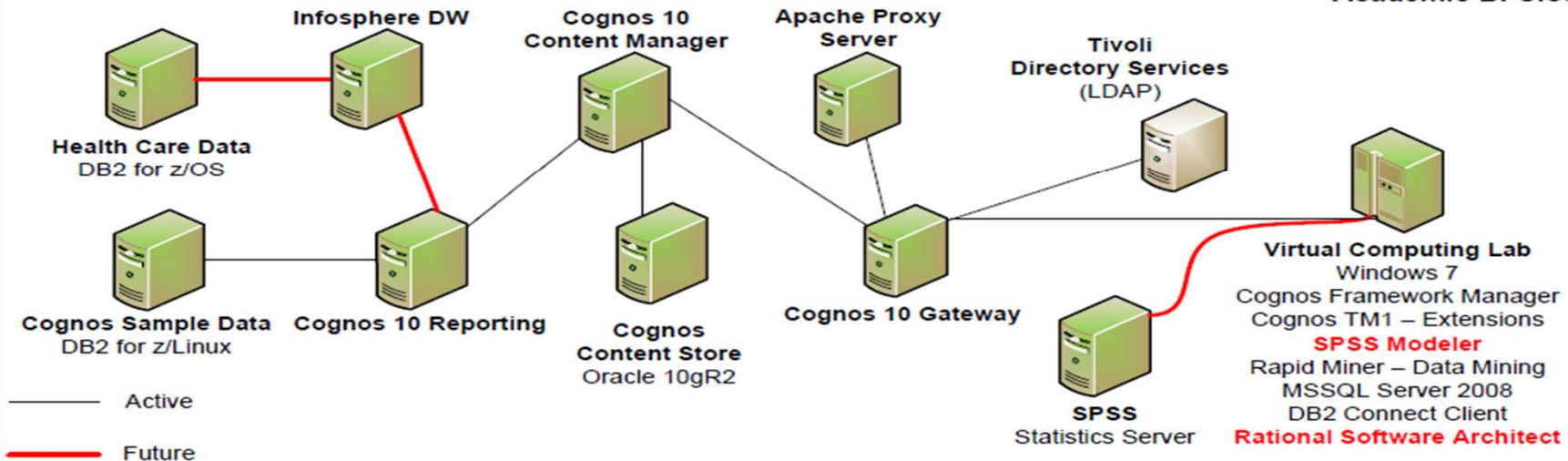
### Success on System Z (continued)

### *Cognos Cloud on System z and Virtual Computing Lab (VCL)*

#### Marist College Business Intelligence Cloud



#### Academic BI Cloud





## What is going on in Higher Education?

- Mainframe has been a mainstay of R1 research institutions for years...
  - But only in academic departments
  
- 1995 (ish) - Client server architecture catalyzed massive migration to distributed computing
  - Most sitting CIO's were 'educated' during this period
  
- 2000 (ish) – Independent Vendors sold software that could not “share” a server
  - Operating systems were not ubiquitous (like Linux)
  - Departmental servers became the fad
  - The “CIO” as an executive position was new
    - ✓ Technology spending was rampant and out of control
  
- Transaction supported industries stuck with the Mainframe
  
- In general, Higher Education did not



## What is going on in Higher Education? (continued)

- Quote from CIO of a multidistrict community college in the west (107,000 students)
  - *“It is a little scary with all the cloud-i-fiction going on. It’s like we are being forced back to Mainframe.”*
  
- Quote from the CIO of a Large State Public Education IT Center
  - *“I can’t go back to Mainframe. It would change everything.”*





What Will Happen Next?

The return to the Mainframe will be the next large

**DISRUPTION**

in Higher Education Systems Management

- College and Universities will seek better return on Assets
  
- The Discussion to migrate will begin with the CFO
  - Not the CIO



# Open Discussion / Questions