Boston University

Linux on System Z and Oracle

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Boston University
13595 Room 309

Wednesday, August 14 2013 16:30-17:30

Agenda

- Boston University
  - The History
  - Hosted Services and Database Administration
  - System Z involvement
  - Challenges
  - System z Solution
  - Experiences in a Centralized Enterprise Data Warehouse
  - The Business Value Gained
  - Future Directions

About BU

Boston University is no small operation. With over 33,000 undergraduate and graduate students from more than 140 countries, 10,000 faculty and staff, 16 schools and colleges, and 250 fields of study, our two campuses are always humming, always in high gear. Meet the people and places that keep the University running smoothly.

Our DNA

Civil Rights leaders, Nobel Laureates, over $375 million in research funding last year, BU's narrative is constantly unfolding. Our numbers tell a story, too, from classrooms and libraries to religious groups and study abroad programs.

Our DNA

also see

BU Timeline
BU Today
Bostonia

Trustees

The Trustees are responsible for the establishment and oversight of the University. Here, you'll find information about the board's duties, emeriti, the Board of Overseers, and contact information.

Trustees Website

also see

Current Members
Committees
Overseers

Administration

Meet the senior administrators of Boston University, who are in charge of all aspects of operations from academics, alumni, and student services to technology, legal, and external affairs.

Senior Administration

also see

President's Bio
Strategic Plan
Annual Report

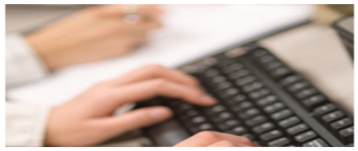
Medical Campus

Boston University Medical Campus (BUMC), in the historic South End, comprises the Schools of Medicine, Public Health, and Dental Medicine, as well as the Graduate School of Medical Sciences. BUMC's teaching hospital is Boston Medical Center.

Medical Campus Website

also see

Boston Medical Center
School of Public Health
School of Dental Medicine



Technology

Visit the Information Services & Technology website to learn about computing, communications, and application support for the University, as well as a list of IT resources for specific departments.

IS&T Website

also see

IS&T Training
Tech Calendar
BUworks

Public Relations

Boston University is no stranger to the spotlight. Faculty members regularly provide expert opinion, comment, and analysis on a broad range of subjects. Our veteran public relations team welcomes media requests.

Public Relations Website

also see

BU in the News
News Releases
Contacts

Hosting Services & Technical Administration

- Application Hosting & Management
- Data Archiving
- Database Hosting & Management
- Monitoring
- Server Backup & Restore
- Server Collocation & Management
- Virtual Server Hosting & Management

See Also

- BU Linux

Help

HOME » SUPPORT & INFRASTRUCTURE » HOSTING SERVICES & TECHNICAL ADMINISTRATION

Hosting Services & Technical Administration

Overview	IS&T maintains several data centers throughout the Charles River campus as well as extensive server infrastructure. We can provide your group or department with access to these facilities for physical server hosting as well as servers to run certain applications.
Available To	Faculty, Researchers, Staff, Departments
Benefits	Leverage our infrastructure to reduce the time, expertise, and expense you need to run sophisticated software applications internally.
Key Features	Reduced support costs associated with hosting and running applications.
Requirements	Each service has its own distinct requirements.
Cost	Costs depend upon the particular services provided.
Getting Started	See the topics in the side navigation bar for details on specific service offerings

zLinux: The Timeline

- 1998 Marist College starts research project
- 1999 IBM releases some OCO to OSS community
- 2000 SuSE , Turbolinux Announced
- 2000 BU gets involved in Linux on z (LCDS)
- 2001 Redhat announced
- 2002 64bit distributions announced Debian
- 2004 BU live IBM HostOnDemand Encrypted 3270
- 2005 BU live EOS ThinClient
- 2005 BU live Java Application Servers – WEBREG Schedule
- 2006 BU live uPortal.org my.bu.edu **1st in world zLinux**
- 2007 BU live Oracle 10G on zLinux for BI
- 2009 BU live with Oracle Automated Storage Mgt
- 2009 BU live Informatica for BUWorks data warehouse
- 2009 BU live zSeries Operational Based Guest Creation
- 2010 BU live Oracle 11r2
- 2011 BU Consolidates Open office PDF creation
- 2012 BU Creates and Oracle Blackboard Database
- 2012 BU live with Degree Advice Database
- 2013 BU live with ADW – Academic Data Warehouse
- 2013 BU Inband Actifio

Our Business Challenges

- Economic Factors
  - Initial and ongoing Software Costs
  - Project Costs - Staying within Budget
  - System Maintenance Costs
  - Staff Management Overhead
  - Support Costs - with Reduced Resources

- Technical Factors
  - Agile high-available infrastructure for applications
  - Availability and Service Level Adherence
  - Decentralized Server Management
  - Maintaining Strong Security Models
  - Reduce Project Life Cycle Times & Delivery
  - Complicated Disaster Recovery Procedures

- Environmental Factors
  - Effective Scalable Power Consumption

Solution Strategy: Virtualize Oracle

- Business Drivers: Reliability, Availability, Service, Scalability, Security
  - Oracle Maximum Availability Architecture (MAA) with System z
    - Dynamically add and manage disk (Oracle ASM)
    - Centralized backup and recovery of Oracle databases (Oracle RMAN)
    - Acquire resources once use many (IBM zVM server virtualization)
    - Native high-speed support for internal data flows (IBM z Hipersockets)
    - Linux virtual server monitoring and capacity planning (Velocity Software monitor stack)
    - Remote read/support configuration (Metalink Credential Configuration)
    - Automated systems management (LoZ, Oracle Grid)

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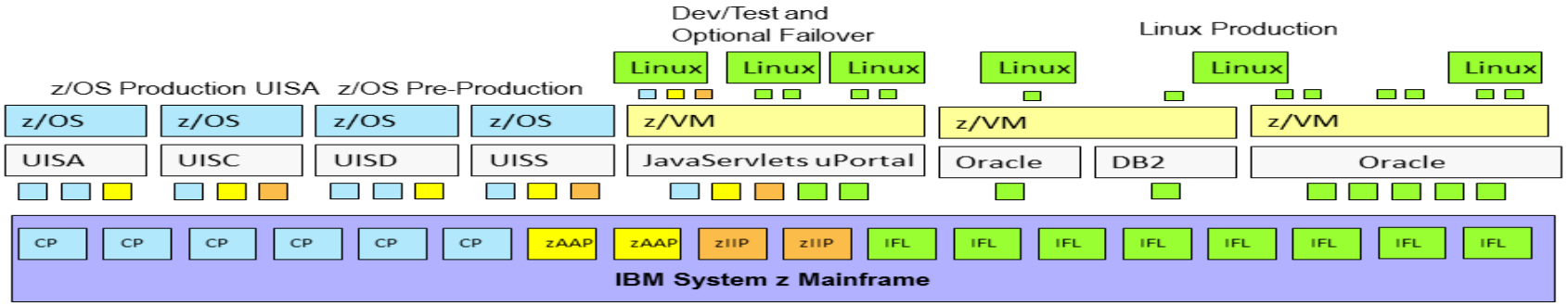
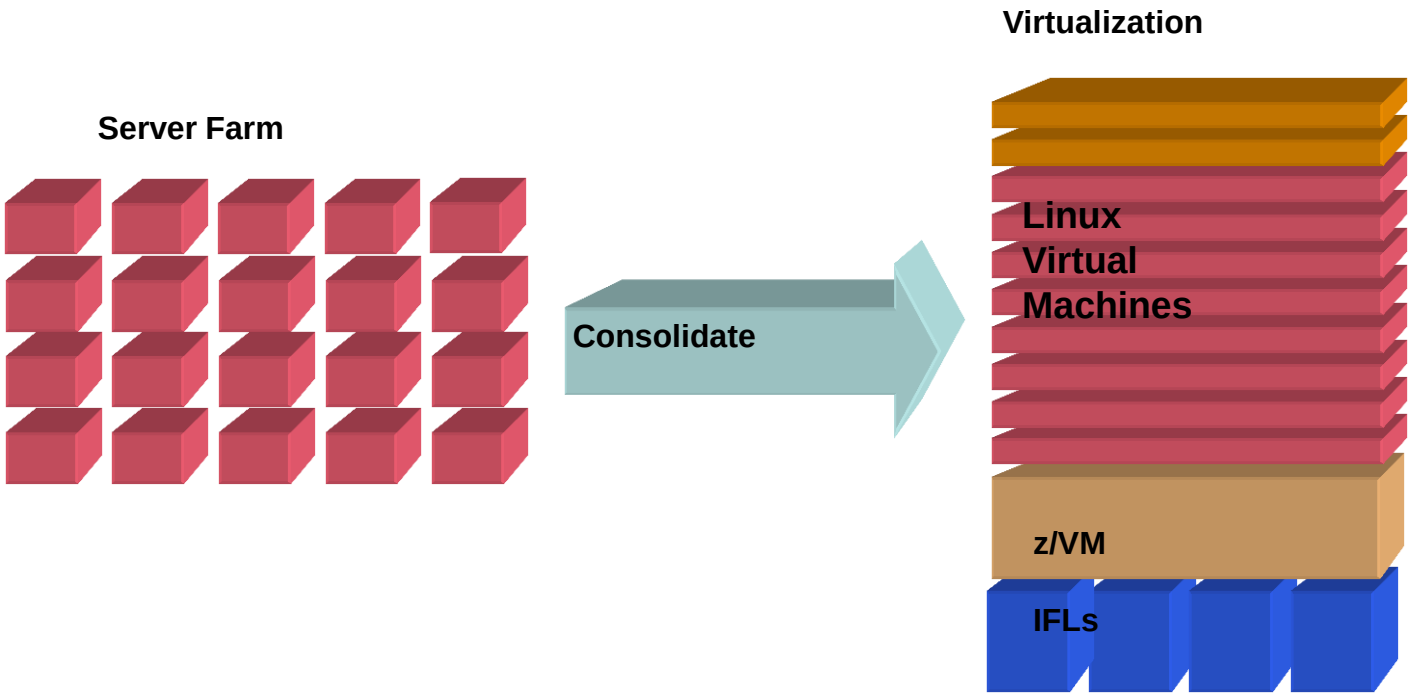
The Power and Flexibility of System z Virtualization
At Boston University

- Over 40 years of continuous innovation in virtualization technologies
- Multiple images concurrently share all physical resources
- Resources delivered as required, automatically, based on business-oriented goals
- New OS images can be started without affecting ongoing work
- Hardware assists used to accelerate virtualization operations
- Native Rock Solid Platform Security



System z and Oracle

‘The Server Farm in a Box’



Systems Administrator Functions

- Infrastructure Design – Guest Creation
- Guest directory – CPUs/Memory/Minidisks
- Cloning considerations /usr /opt /var
- Network/Security Infrastructure design – VCTC/Guest lans/QDIO
- File System Structures – Types and mountpoints
- Operating System installation and formatting
- Application installation and tailoring
- Disaster Recovery planning and validation
- Performance and Capacity planning – z/VM and z/Linux
- Tooling exploitation – Mix of OSS/vended components
- Debugging – z/Series specific (strace, SysRq, top, s390dbf)
  - Kernel debugging – RAS, LTT – tracing toolkit, dprobes, kdb
  - Event logging – standard logs and vmlogs guest logs

Consolidating Oracle Databases to Linux on System z

- The Value of Linux on System z is in Virtualization
  - **The best TCO** characteristics can be obtained from consolidating many servers with low CPU utilization and taking advantage of the **virtualization capabilities of z/VM**.
    - Improved TCO
      - *Reduced costs*
      - *Simplified infrastructure*
    - On-Demand environment
      - *Capacity when needed*
      - *Greatly improved flexibility*
  - Linux also scales well in an LPAR or in z/VM
    - The System z10 BC class systems compete well with other platforms
    - Great scalability for consolidation of a large database
    - Incremental upgrades
      - *No more "forklift" upgrades*

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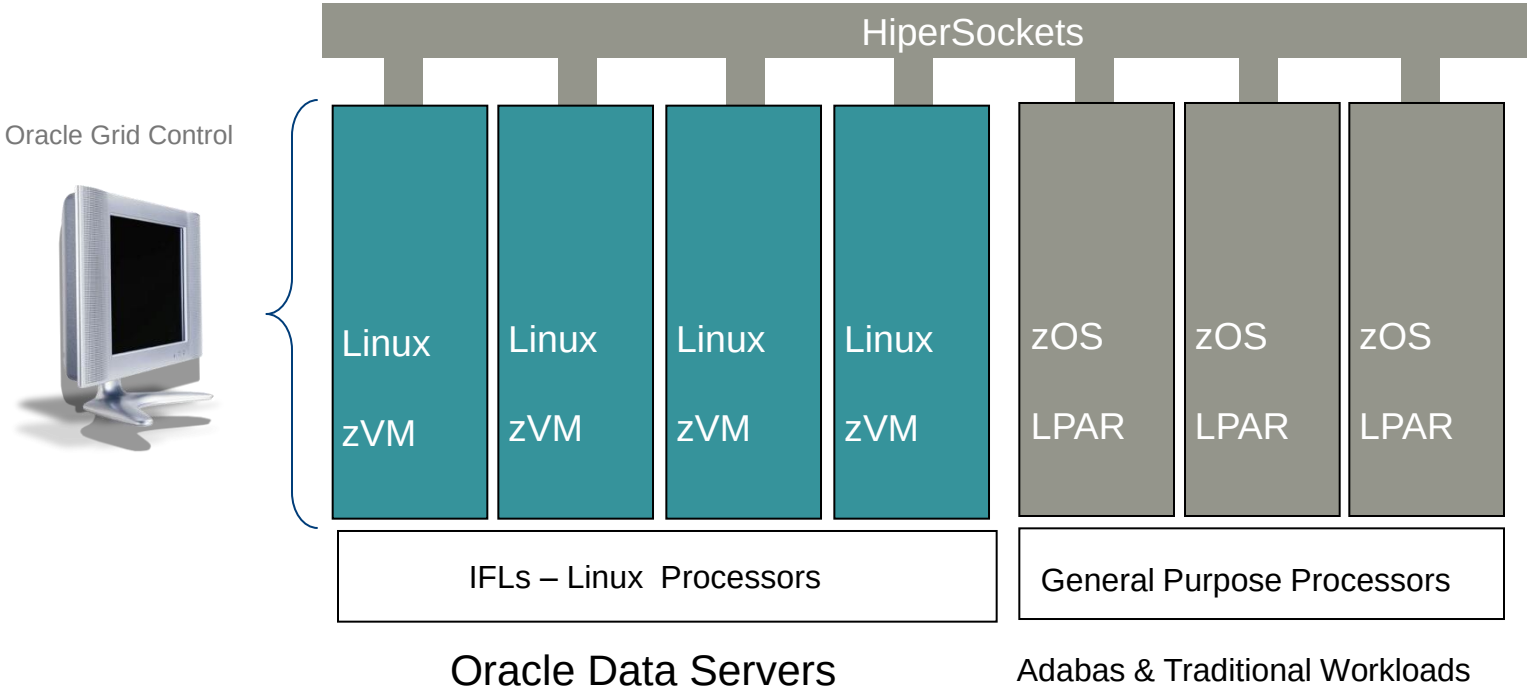
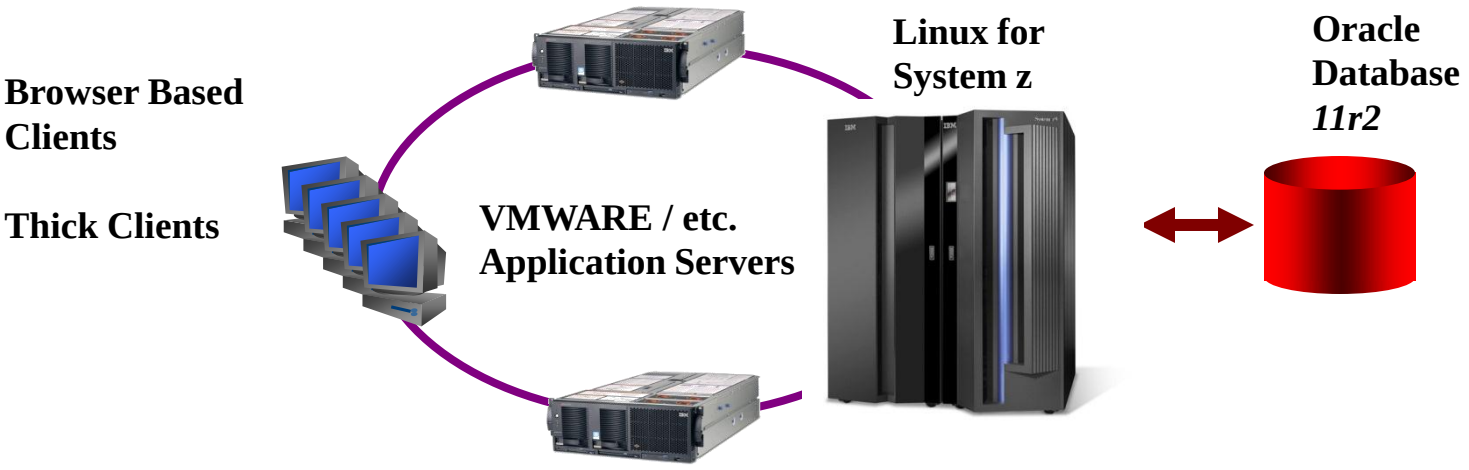
BU Applications

Oracle Grid Infrastructure for Applications



Oracle Split Tier

- All the applications are split configuration architectures
  - Only Oracle Database 11r2 certified for above applications with Linux on System z
  - The middle tier, regardless of application server, must be implemented on a platform other than System z



BU Oracle workloads

Business Intelligence BU-DAR (PROD 10/2007)

Data Warehouses built for client data.
Oracle Warehouse Builder and database replication with Java – XML utilities.
More projects in the active project list.

Degree Advice (PROD 2011**)**

Dynamic Student Academic Report

Kuali Database Projects (03/2011)

Kuali – Grant Management System (Prod 2011)

ImedRIS Database (10/2010**)**

Compliance database

University Document Imaging (PROD 10/2008)

Scanning, retrieval, workflow
Onbase System Selected
Target Oracle 10G
Enterprise Wide System (5 Intel front ends)
Stress showed good performance – Optimizing dynamic queries
Platform Integrated with zOS system

Oracle Grid Control

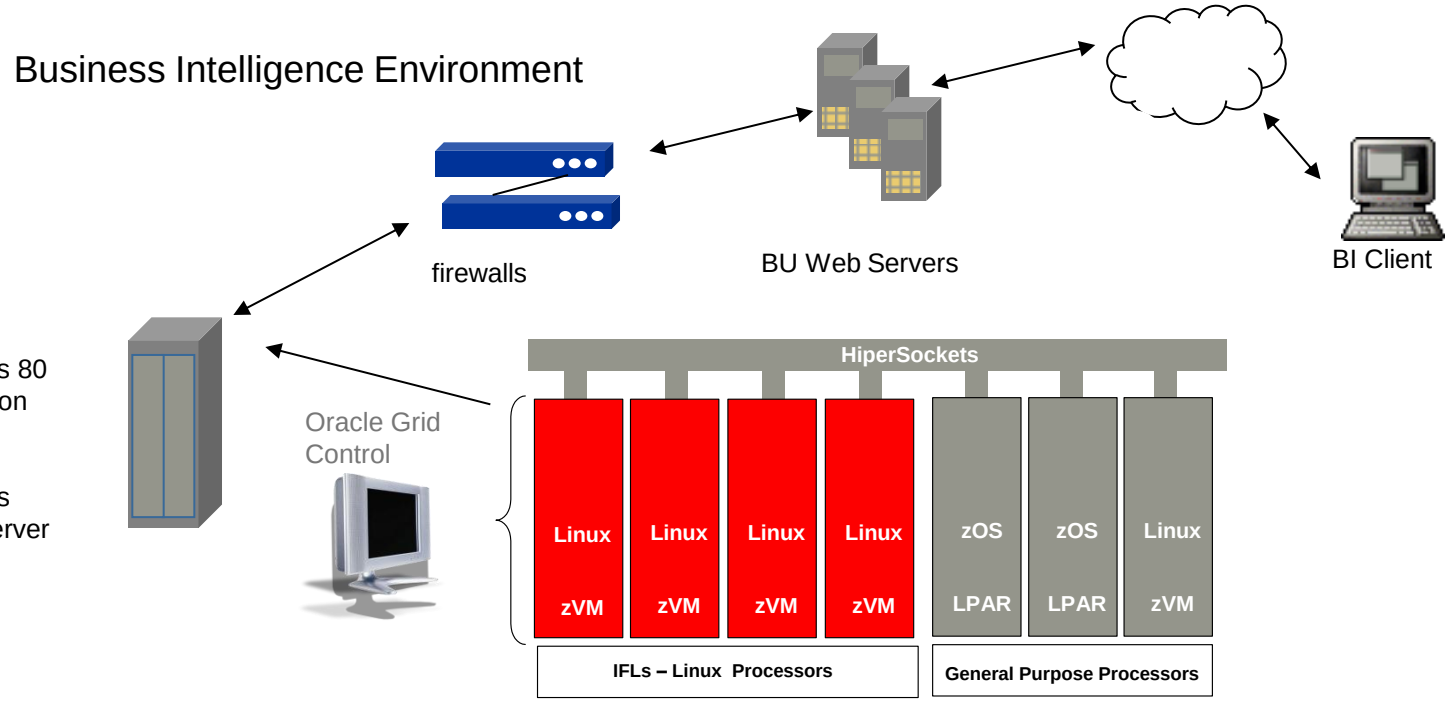
Monitor Report Resolve

BU Applications - Other

- **Java Enterprise Edition Project** (PROD 2005)
  - Student Graphics Scheduler – Student Schedule Matrix - *Very successful*
  - BUCHART – Faculty charting tool
  - Schedule Servlet – Student Course schedule matrix
  - ID-Sync Project – Quartz Scheduler, Hibernate JDBC interface
  - IBM HostOnDemand – Java Servlet Emulation Client

- **DB2 zLinux PhotoID project –** Universal ID (PROD 2004)
  - All Students , Faculty, Staff have a Universal ID

Business Intelligence



Pseries IBM
Microstrategies 80
WEB Application
Java
Tomcat 5.5.20
Microstrategies
Intelligence Server

Linux on z10 BC
•Oracle 11G Data from zOS ADABAS via ADABAS Replicator

Oracle Data Servers

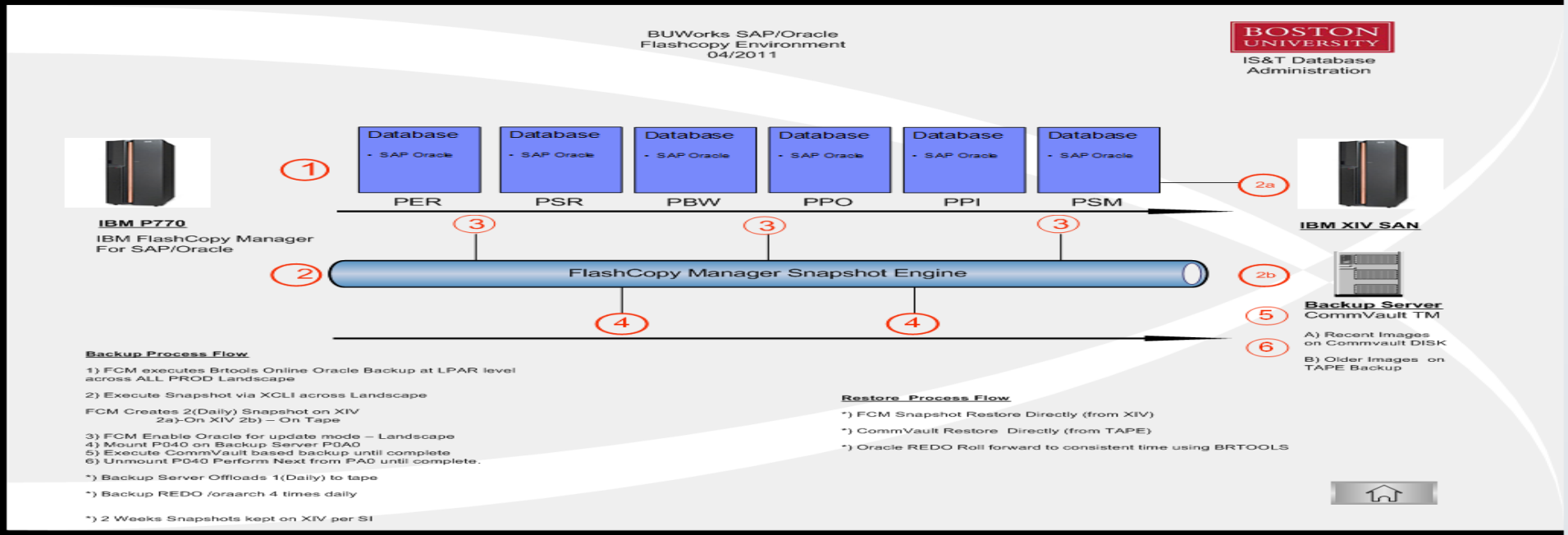
Data Direct Wire Protocol Driver

Adabas & Traditional Workloads

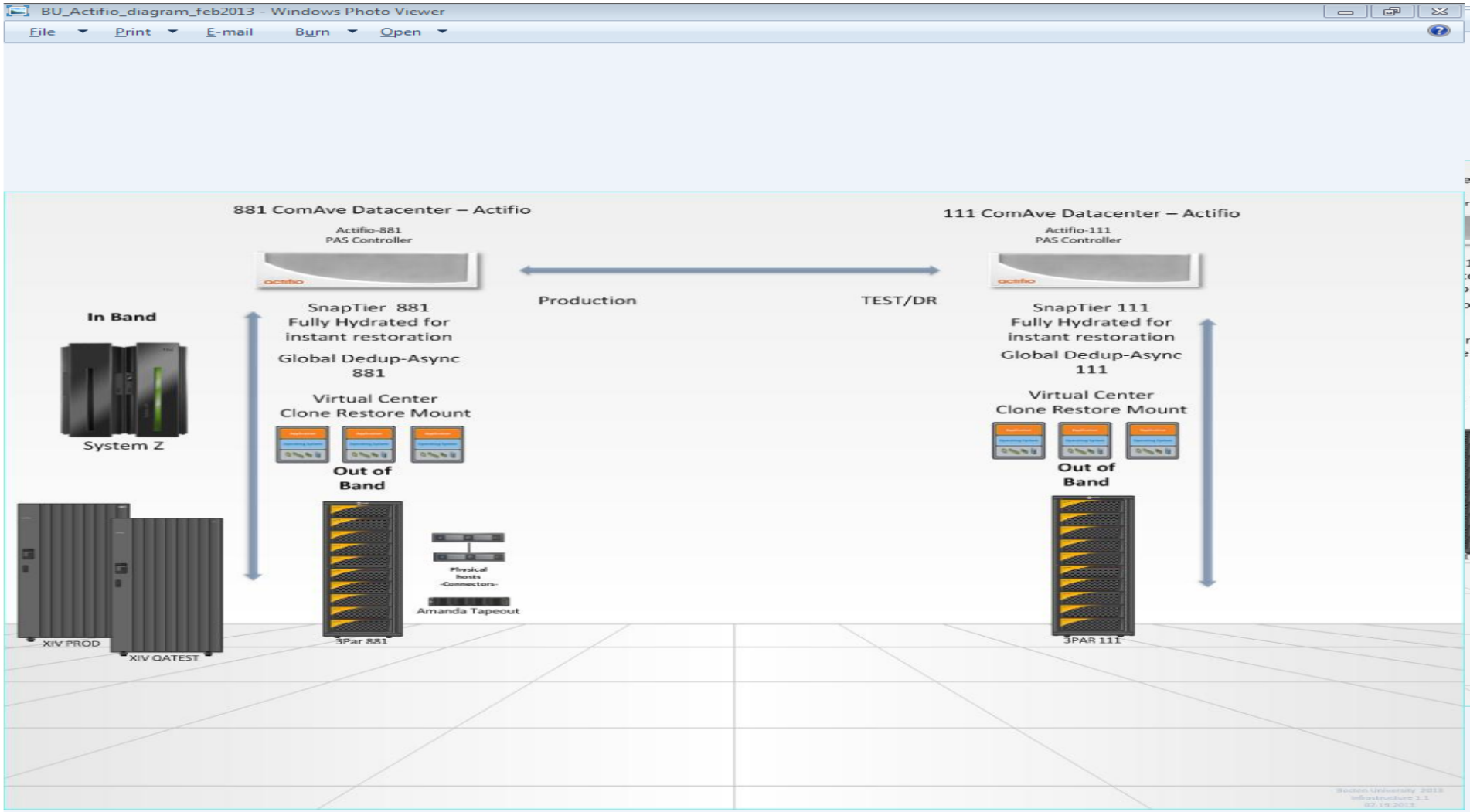
Feeds data to Oracle via Adabas

Z10 BC zOS ADABAS Server
•ADABAS provides data to Oracle via Hipersockets Interface

BU Oracle - Other



BU Actifio Deployment



BU Actifio Deployment

Summary zBU

- Non-Disruptive Resource Facilitation
- Rock Solid Virtualization with zVM
- Excellent Scalable (dynamic) performance – IFL growth, Memory, OSA
- HiperSockets support – All guests for backups, installs via hipersockets.
- Demonstrated Consolidation Opportunities
- Demonstrated Cost of Computing Reductions

- **Standardized** – Reduced Complexity
  - Simplified IT Operations by reducing manual build efforts
  - Simplified Software Systems for Staff, Faculty and Students resulting in streamlined decision support improvements

- **Virtualized** – Provided Maximum Availability
  - Improved Applications Availability
  - Improved Quality of Service “Uptime” by using MAA
  - Continuous Data Availability

- **Consolidated** – Reduced Costs
  - Improved Operational Efficiency via n-Tier environment

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Resources

- Solution Design
  - Oracle Sales Development – System z
  - Oracle/IBM Joint Solution Center
  - IBM System z Solution Specialists
    - Gaylan Braselton gbrasel@us.ibm.com
  - Mainline Information Systems
    - Dave Burke David.Burke@mainline.com
- Solution Testing
  - Oracle z Lite – pre-configured Oracle/System z environment