



# Shared Data Centers: Something Old and Something New

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# Introduction...

- **Common problems we face in data centers**
- **What has changed...**
- **Revisiting old lessons...**
- **What we have done with NWRDC**
- **Additional Challenges**

# The problems that we face...

- Hard to get funding for a data center...
- Defining capacity?
- How much redundancy can we afford?

# The problems that we face...

- Data centers are expensive, but we need them
- Three factors driving costs for building data centers<sup>1</sup>
  - Power & Cooling capacity
  - Tier Rating (redundancy)
  - Available Floor Space

# The Three Factors...Power and Cooling

- Changes in density due to modern mainframes, blade systems, multi-core processors, and virtualization have changed the model for measuring floor space density
- No longer measured by \$\$/sqft alone, but kW/sqft

# The Three Factors...Tier Rating

- UpTime Institute Tier Ratings<sup>2</sup>
  - Certified Tier Classifications can only be granted by the UpTime Institute
  - See <http://uptimeinstitute.org>

# The Three Factors...Tier Rating

- Tier I – Basic Site Infrastructure
  - Has non-redundant capacity components
  - Single non-redundant distribution path
- Tier II- Redundant Site Infrastructure
  - Has redundant capacity components
  - Single non-redundant distribution path

# The Three Factors...Tier Rating

- Tier III – Concurrently Maintainable Site Infrastructure
  - Has redundant capacity components
  - Multiple independent distribution paths
- Tier IV- Fault Tolerant Site Infrastructure
  - Has multiple independent isolated systems that provide redundant capacity components
  - Multiple independent active distribution paths



# The Three Factors...Floor space

- How much floor space do you need?
- Expansion room?
- What is going into the data center now?
  - 3 Years from now?
  - 5 Years form now?
  - 10 years form now?
- Remember the floor space alone does not dictate capacity

# Total Cost of Ownership?

Knowing TCO before you begin helps plan what you need:

- \$\$ per server- useful if you know all equipment that will be used
- \$\$ per kW - you do not know the servers, but know the power available for systems
- \$\$ per sqft – varies wildly depending on floor density

# The problems that we face...

- Not just a facility...What goes IN the data center?
- Different technology models
  - Windows vs. Linux vs. AIX vs. Solaris vs. ....
  - Oracle vs. SqlServer vs. DB2 vs. MySQL vs.....
  - Can your staff support them all?

# The problems that we face...

- End up reinventing the wheel...
  - Localized storage
  - Localized backups
  - Physical equipment
  - Localized UPS

# Why do we have our own data centers?

- Making sure OUR business needs are met ...
- Not competing for resources
- Admit it...It's fun! We like technology...

# What has changed?

## Change in Technology models:

- Move to client-server computing
  - Computing power and workload is distributed
- Move to web-based computing
  - Smaller footprint needed at the desktop, but workload is still distributed
- Cloud computing
  - Core systems are...somewhere....

# What has changed?

## Change in Business models

- IT business requirements have shifted
- More about integrating technology into business processes than just managing hardware

# What has changed?

## Change in Security Requirements

- FERPA, HIPAA, Sarbanes-Oxley, etc.
- State requirements on personal identifiable information (only 3 of 50 states do not have statute regarding some sort of response in case of a breach involving PII) <sup>4</sup>
- More and more time spent in data management, instead of SYSTEMS management



# Revisiting something old...

- In the beginning, LARGE computers required LARGE facilities...
  - Specialized cooling
  - Lots of power
- Dedicated staff ran the system, which had a wide range of users (administrative, academic, research)

## Revisiting something old...

- Mainframe services often built around the utility model. You pay for what you use...
- Shared cost model...institutions could share mainframes or purchase time commercially

# Compare this to our current needs...

- Now data centers house
  - Administrative\ERP systems (Financial, HR, student systems, etc?)
  - High performance computing clusters
  - Learning Management Systems
  - Library Management Systems
  - Portal\web services
  - Systems for specialized applications

# So what if we worked together?

- Costs of expensive infrastructure shared among many...
  - Can afford to “do things right.”
- Instead of worrying about basic system support, campus IT is able to concentrate on their business needs.

## So what if we worked together?

- Able to support a wider range of technologies, resulting in more flexibility.
- Able to implement new technologies more efficiently than you can in a “one customer”, dedicated data center.

# Northwest Regional Data Center

- NWRDC founded in 1972 as one of four regional data centers serving State University System of Florida
- 100% self funded
- Provide services to universities, community colleges, K12, as well as city, county, and state government entities

# NWRDC Customers

- 38.1% Universities
- 46.6% State Agencies
- 10.4% K-12 School Districts
- 4.9% Local government\Community College

# Northwest Regional Data Center

While an auxiliary of Florida State University, we operationally report to a Board made up of our customers

- So customers outsource, but continue to have a say in the operational control of the data center
- Management Committee has oversight of financial operations
- Technical Committee interacts and advises on technology within the data center



# NWRDC

- Founded as a mainframe co-op
- Floor space designed for large systems, but systems have gotten smaller
  - How do we use that large resource?
- Evolve our technology, knowledge, and business practices to meet current needs of our customers

# NWRDC and State of Florida

- Founded within the State University System of Florida
- Used as the model for data center consolidation for State Agencies
  - 1 of 3 primary data centers for the State of Florida
  - Resulted in increase in state government customers, but roots are in education

# NWRDC Services

- Mainframe
  - Primary application hosting
  - Hosting applications for sunsetting
  - DR services
- Server hosting
  - Collocation
  - Managed Services
- Software as a Service (SaaS)

## Some issues that we have:

- Budgeting can be difficult.
- While we are a utility based service, the customer usually is not.
- Takes time to gather information, as customers do their budgets to determine what they have to work with.
  - Budget is almost a reversed model.

## Some issues that we have:

- The shared cost model works great when you have many customers.
- What happens when you just have ONE?

## Some issues that we have:

- New services can be hard to start without risk
  - Risk to the Data Center
  - Risk for the Customer
- Customer 2, 3, 4 are much easier than customer #1.



# References

<sup>1</sup>**Dollars per kW plus Dollars per Square Foot Are a Better Data Center Cost Model than just Dollars per Square Foot Alone**; Turner, W. Pitt; Seader, John H.; 2006; The Uptime Institute

<sup>2</sup> [http://professionalservices.uptimeinstitute.org/understand\\_tier.htm](http://professionalservices.uptimeinstitute.org/understand_tier.htm); The UPTime Institute

<sup>3</sup>Data center TCO; a comparison of high-density and low density spaces; Patterson, M.K.; Loeffler, M. ; Intel; submitted to THERMES 2007

<sup>4</sup>**COMMERCIAL LAW LEAGUE OF AMERICA**;  
<http://www.clla.org/documents/breach.xls>; April 2010



# Abstract

- The idea of sharing a data center within an institution is very common, where various academic, administrative, or research units share the costs of a very specialized facility and its resources. However, with the current push toward cloud computing and utility-based services, these resources can be shared by multiple institutions and organizations, providing a true cost sharing environment akin to a "computing co-op." An example of such a facility within the State of Florida is the Northwest Regional Data Center, which provides services for universities and community/state colleges, as well as state, county, and city governments.