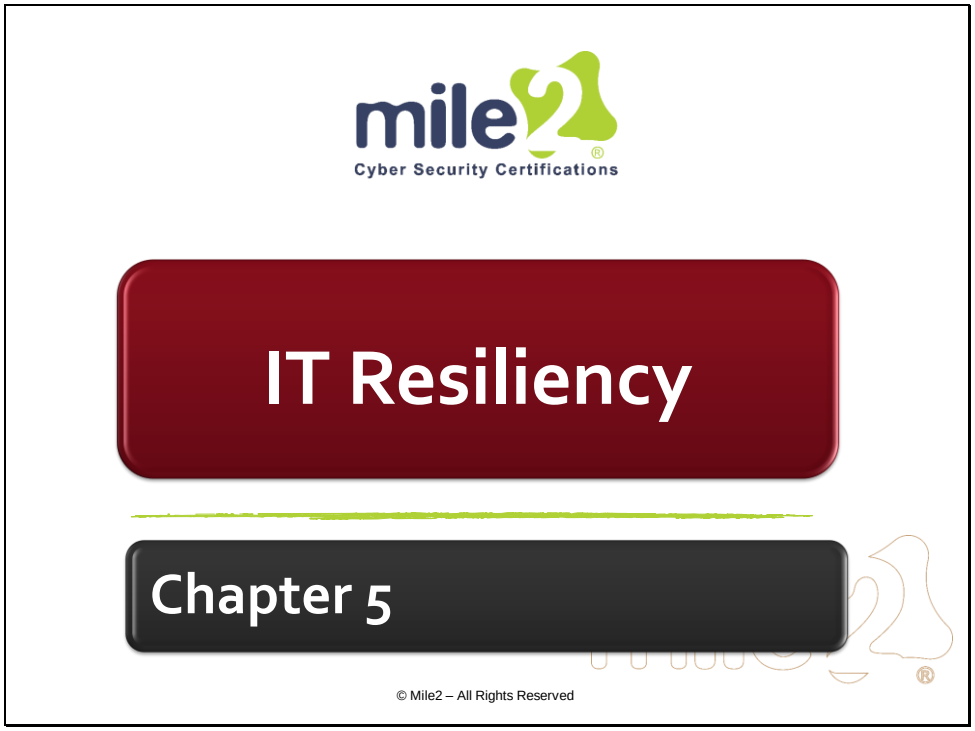
CDRE - Certified Disaster Recovery Engineer

Chapter 5 - IT Resiliency

WORKBOOK

Slide 1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Chapter 5
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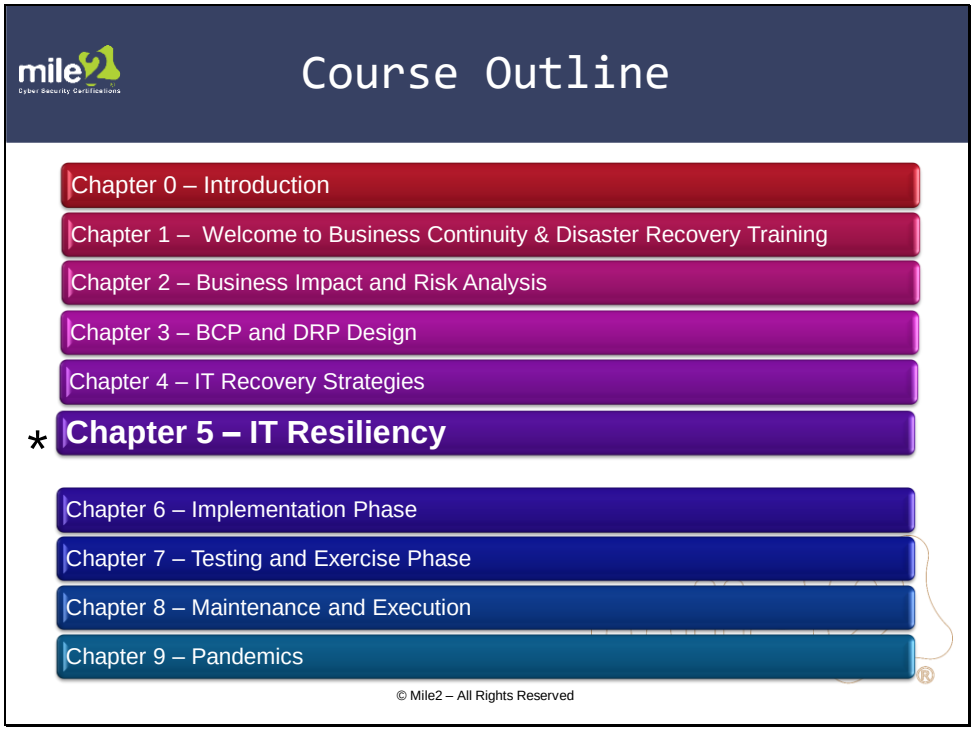
Course Outline
Chapter 0 – Introduction
Chapter 1 – Welcome to Business Continuity & Disaster Recovery Training
Chapter 2 – Business Impact and Risk Analysis
Chapter 3 – BCP and DRP Design
Chapter 4 – IT Recovery Strategies
* Chapter 5 – IT Resiliency
Chapter 6 – Implementation Phase
Chapter 7 – Testing and Exercise Phase
Chapter 8 – Maintenance and Execution
Chapter 9 – Pandemics
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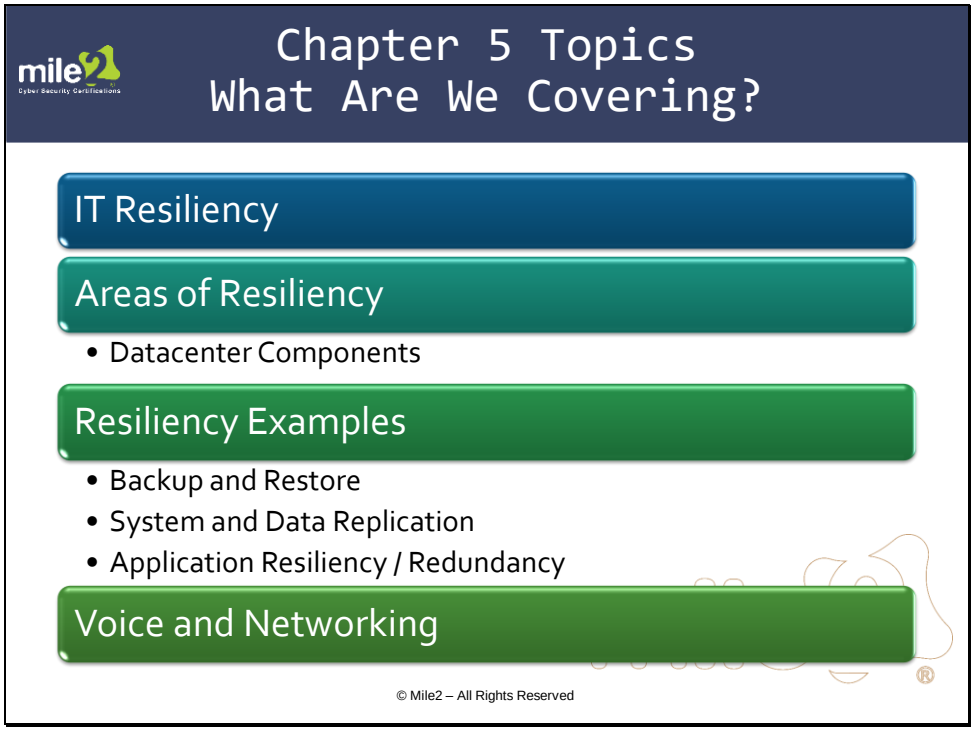
Chapter 5 Topics
What Are We Covering?
IT Resiliency
Areas of Resiliency
• Datacenter Components
Resiliency Examples
• Backup and Restore
• System and Data Replication
• Application Resiliency / Redundancy
Voice and Networking
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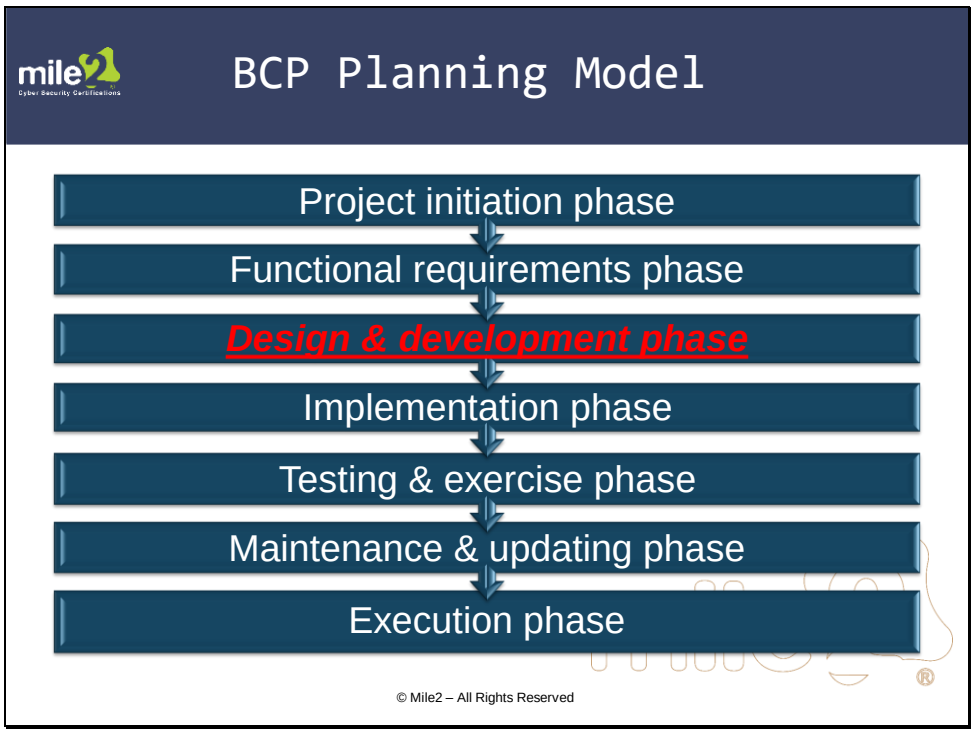
BCP Planning Model
Project initiation phase
Functional requirements phase
Design & development phase
Implementation phase
Testing & exercise phase
Maintenance & updating phase
Execution phase
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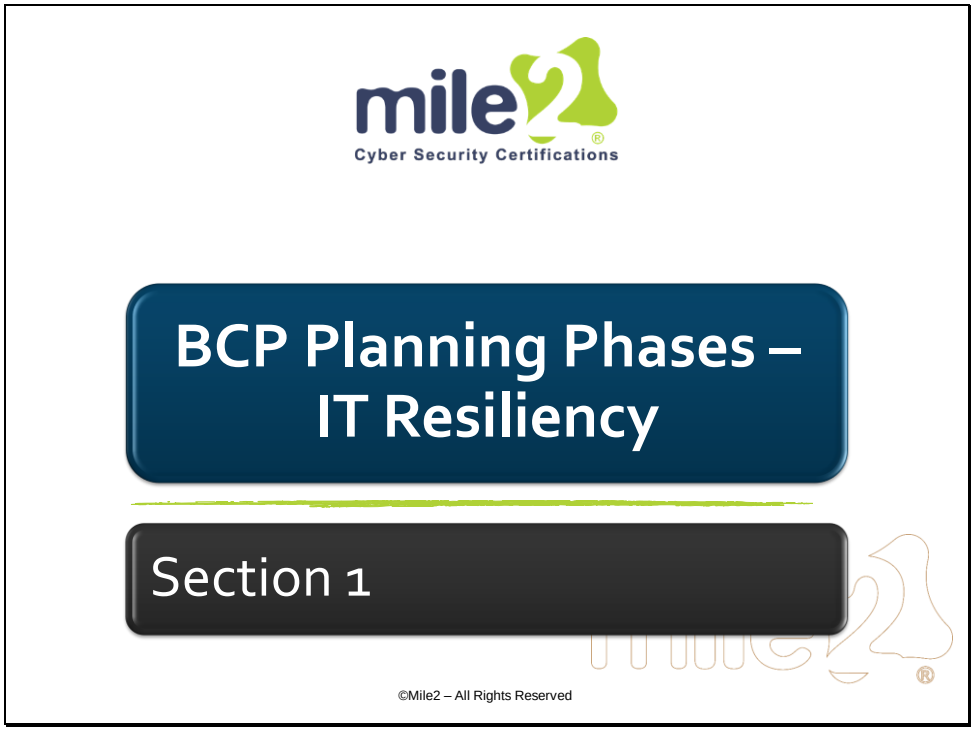
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BCP Planning Phases – IT Resiliency
Section 1
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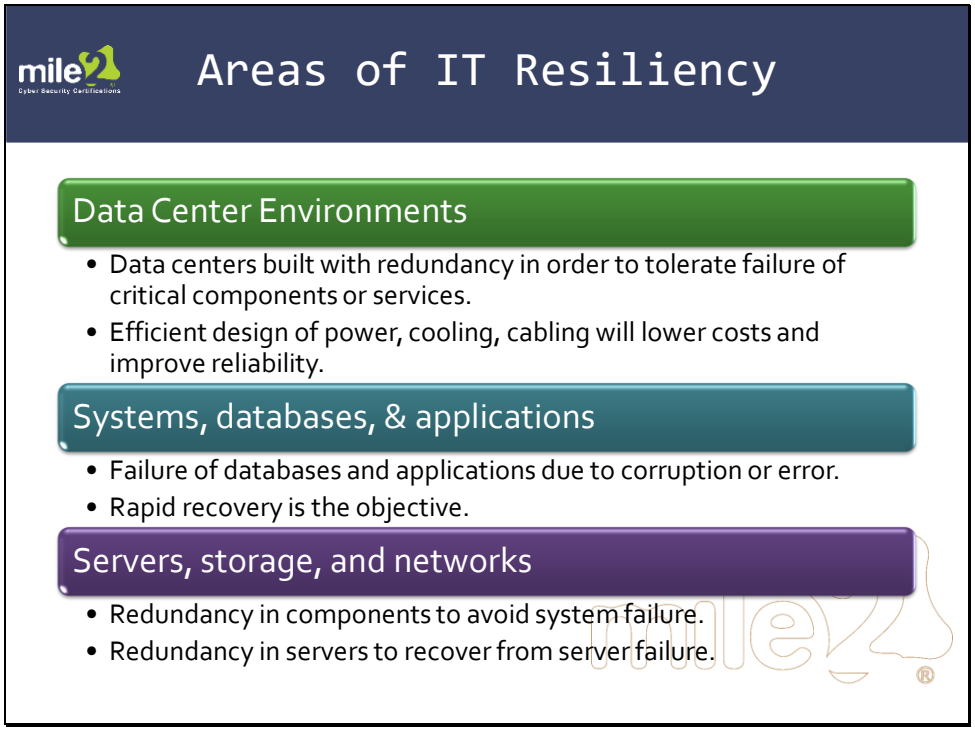
Areas of IT Resiliency
Data Center Environments
• Data centers built with redundancy in order to tolerate failure of critical components or services.
• Efficient design of power, cooling, cabling will lower costs and improve reliability.
Systems, databases, & applications
• Failure of databases and applications due to corruption or error.
• Rapid recovery is the objective.
Servers, storage, and networks
• Redundancy in components to avoid system failure.
• Redundancy in servers to recover from server failure.

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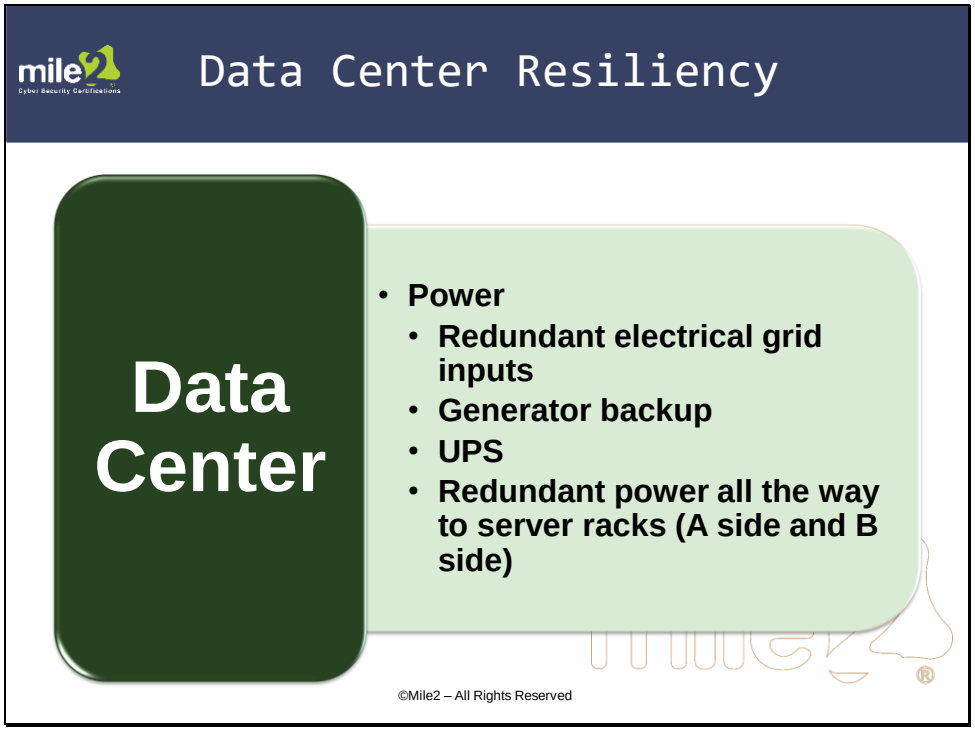
Data Center Resiliency
Data Center
Power
Redundant electrical grid inputs
Generator backup
UPS
Redundant power all the way to server racks (A side and B side)
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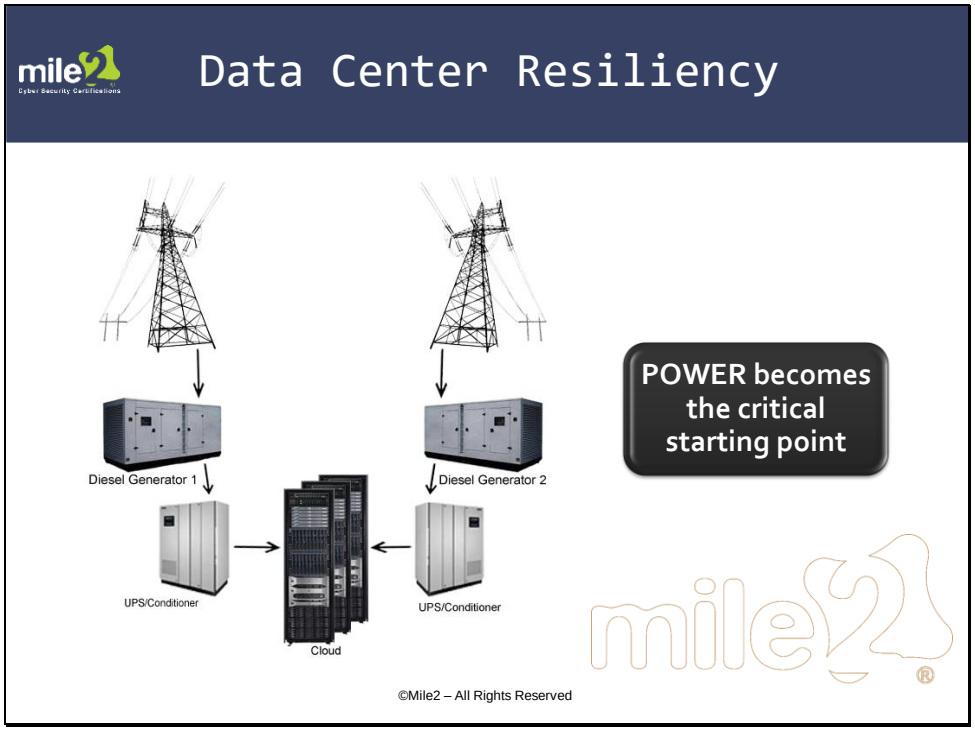
Data Center Resiliency
Diesel Generator 1
Diesel Generator 2
UPS/Conditioner
UPS/Conditioner
Cloud
POWER becomes the critical starting point
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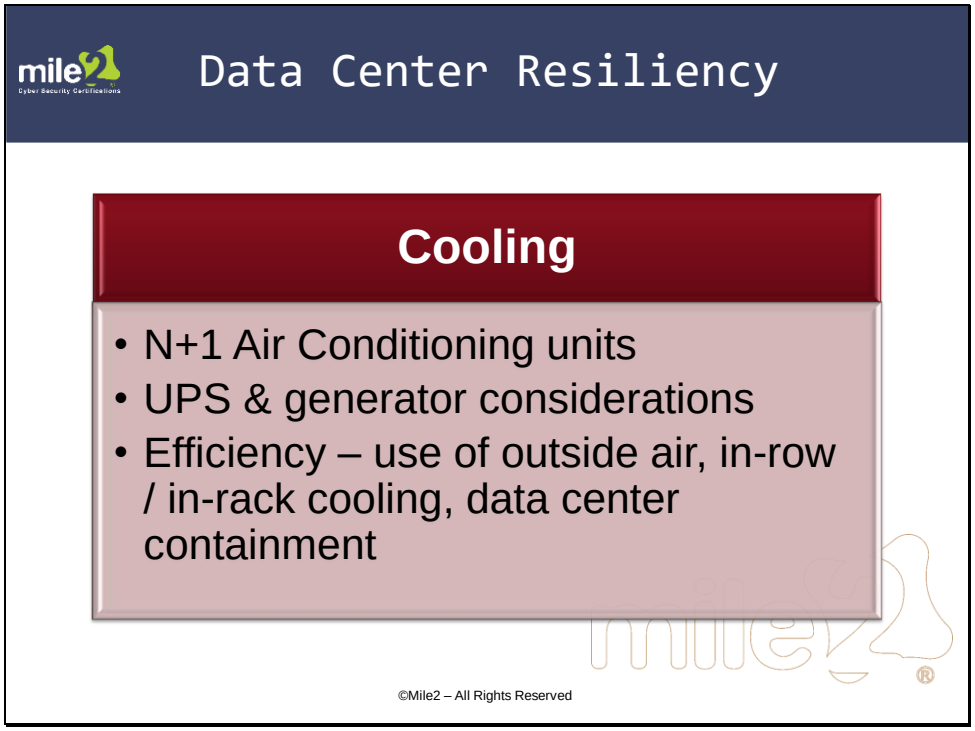
Data Center Resiliency
Cooling
• N+1 Air Conditioning units
• UPS & generator considerations
• Efficiency – use of outside air, in-row / in-rack cooling, data center containment
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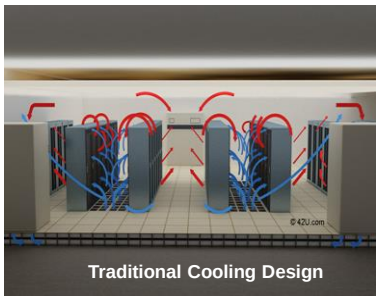
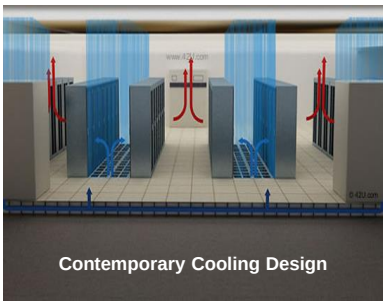
Data Center Resiliency





Cooling Option 1

Cooling Option 2

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Data Center Resiliency

Cooling Option 3

Cooling Option 4

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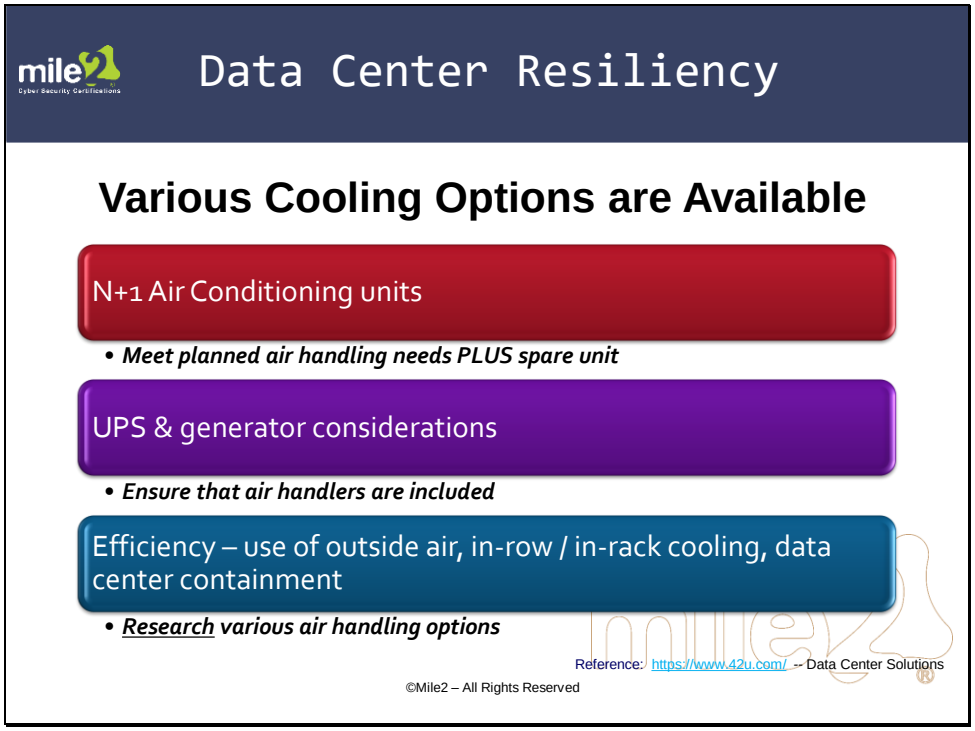
Data Center Resiliency
Various Cooling Options are Available
N+1 Air Conditioning units
• Meet planned air handling needs PLUS spare unit
UPS & generator considerations
• Ensure that air handlers are included
Efficiency – use of outside air, in-row / in-rack cooling, data center containment
• Research various air handling options
Reference: https://www.42u.com/ -- Data Center Solutions
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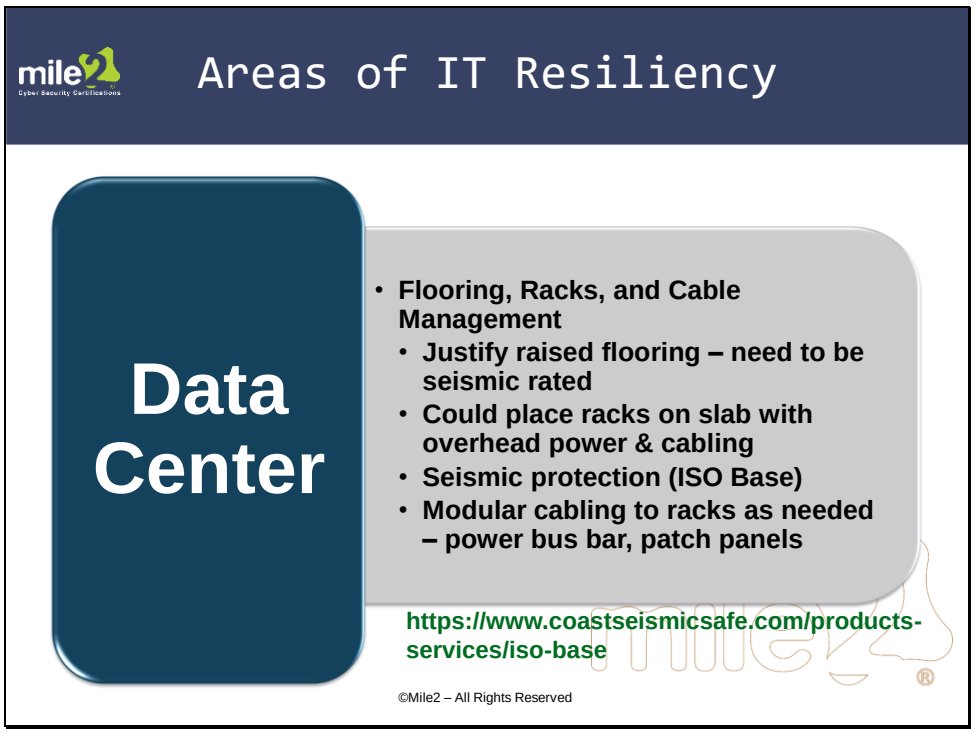
Areas of IT Resiliency
Data Center
• Flooring, Racks, and Cable Management
• Justify raised flooring – need to be seismic rated
• Could place racks on slab with overhead power & cabling
• Seismic protection (ISO Base)
• Modular cabling to racks as needed – power bus bar, patch panels
https://www.coastseismicsafe.com/products-services/iso-base
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Areas of IT Resiliency

ISO-Base™ Seismic Isolation Platform

ISO-Base™ Seismic Isolation Platform with patented Ball-N-Cone™ Isolators

https://www.coastseismicsafe.com/products-services/iso-base

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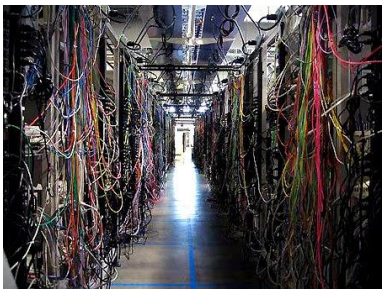
Areas of IT Resiliency

CABLING OPTIONS

CABLING: OVERHEAD VS. UNDERFLOOR



CABLE MANAGEMENT

AVOID SPAGHETTI JUNCTION

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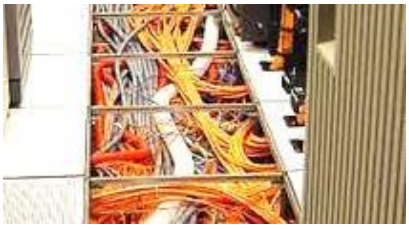
Areas of IT Resiliency

CABLE MANAGEMENT



CONTRACT WITH THE CABLING PROFESSIONALS

BEWARE OF CROWDED CONCENTRATION PANELS AND UNDERFLOOR POWER

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Areas of IT Resiliency

Power bus connections overhead can keep power cabling organized.

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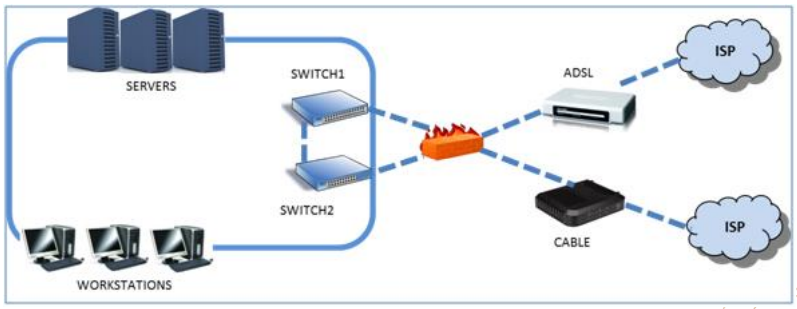
Areas of IT Resiliency

Redundant Pathing to the Internet



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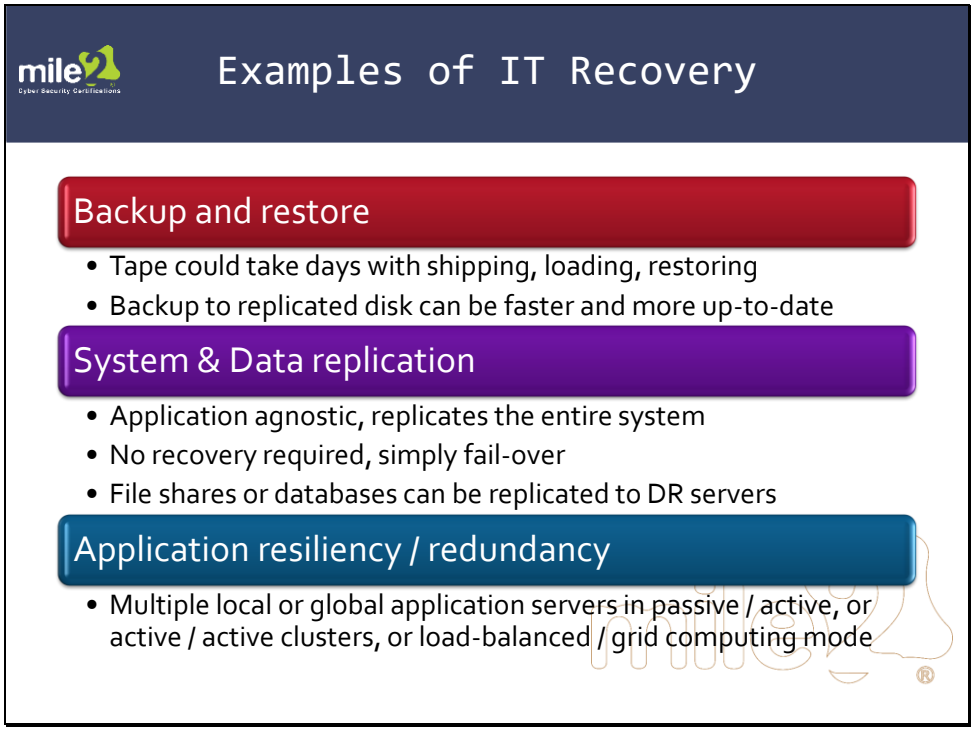
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Examples of IT Recovery
Backup and restore
• Tape could take days with shipping, loading, restoring
• Backup to replicated disk can be faster and more up-to-date
System & Data replication
• Application agnostic, replicates the entire system
• No recovery required, simply fail-over
• File shares or databases can be replicated to DR servers
Application resiliency / redundancy
• Multiple local or global application servers in passive / active, or active / active clusters, or load-balanced / grid computing mode

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Tape Backups

Tape backups

- **"Lower-cost" solution, however, tape handling & vaulting costs remain**
- **Media errors / failures, media lifecycle / migration, and encryption key management**
- **Must utilize off-site vault to protect backups**
- **Regional vault for convenience, too close in a regional disaster?**
- **2nd local copy of backups for faster operational recovery adds cost**
- **Initiation delay for tape restores – locating tape, tape mounts, tape data seek (fast forward)**
- **Less frequent backups – ie: nightly, mean greater data loss**

LOTS OF HISTORY HERE!

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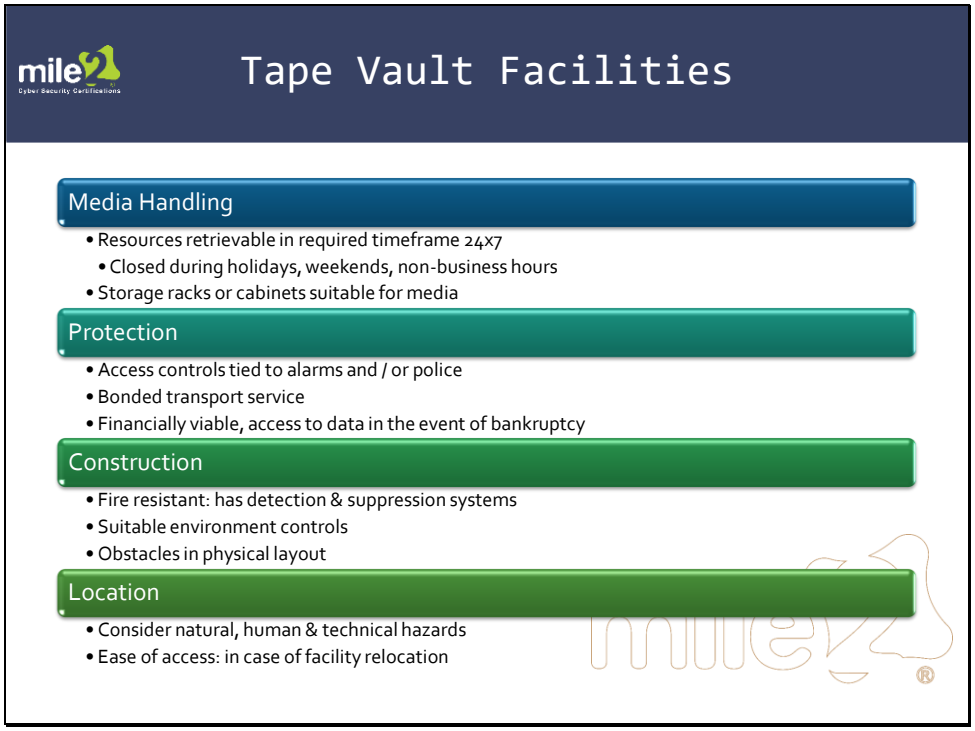
Tape Vault Facilities
Media Handling
• Resources retrievable in required timeframe 24x7
• Closed during holidays, weekends, non-business hours
• Storage racks or cabinets suitable for media
Protection
• Access controls tied to alarms and / or police
• Bonded transport service
• Financially viable, access to data in the event of bankruptcy
Construction
• Fire resistant: has detection & suppression systems
• Suitable environment controls
• Obstacles in physical layout
Location
• Consider natural, human & technical hazards
• Ease of access: in case of facility relocation

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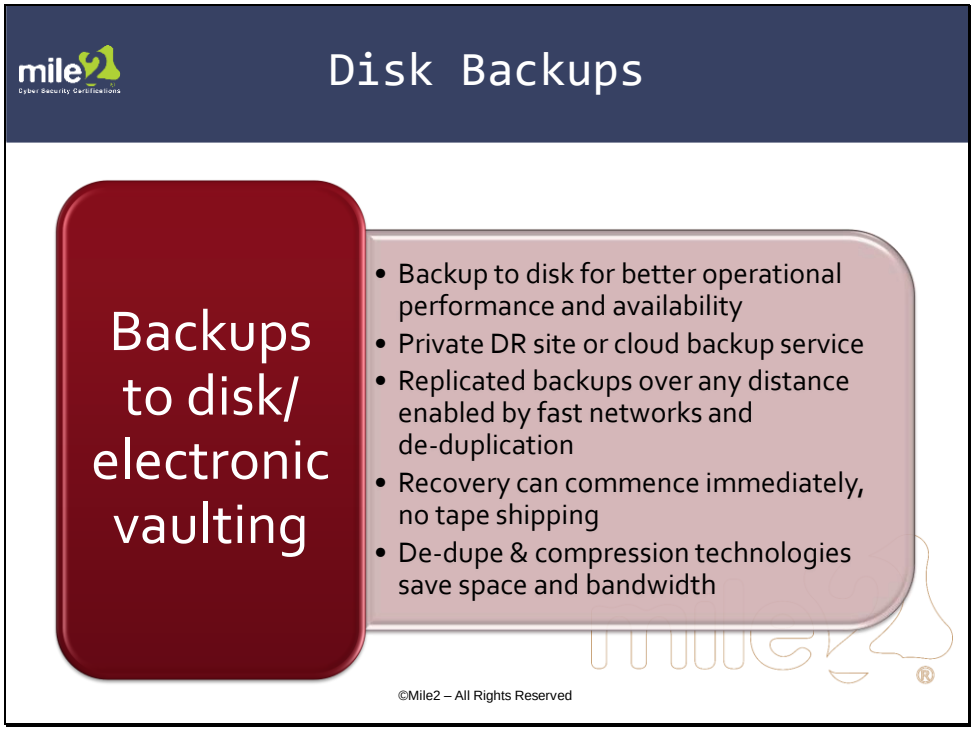
Disk Backups
Backups to disk/ electronic vaulting
• Backup to disk for better operational performance and availability
• Private DR site or cloud backup service
• Replicated backups over any distance enabled by fast networks and de-duplication
• Recovery can commence immediately, no tape shipping
• De-dupe & compression technologies save space and bandwidth
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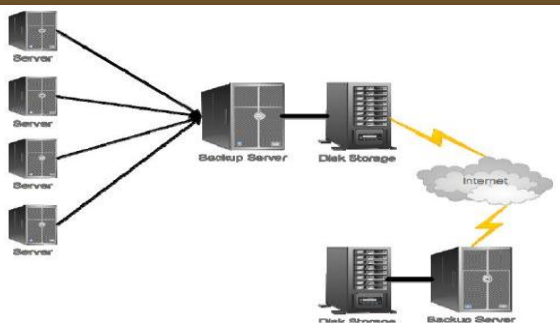
DIY Disk Backups

Backups w/o de-duplication will consume a tremendous amount of disk space. Enabling software de-duplication can save disk space, but will require more CPU power, and likely SSD drives for the de-dupe database.

You end up just moving the bottleneck from one place to another.



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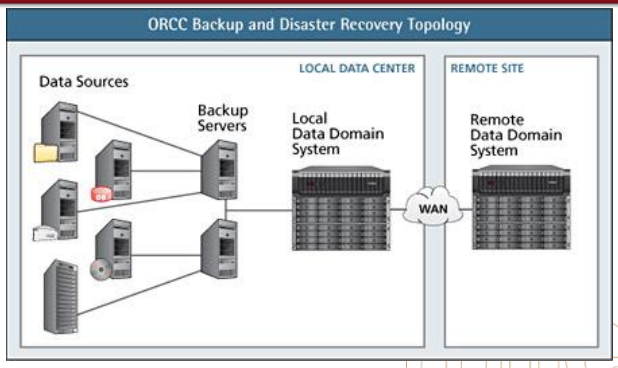
Backup Appliance

Offloading the processing overhead of backup de-duplication to a specialty backup appliance can save money and effort.



https://www.computerweekly.com/feature/Backup-appliance-product-survey-Which-one-is-right-for-your-business

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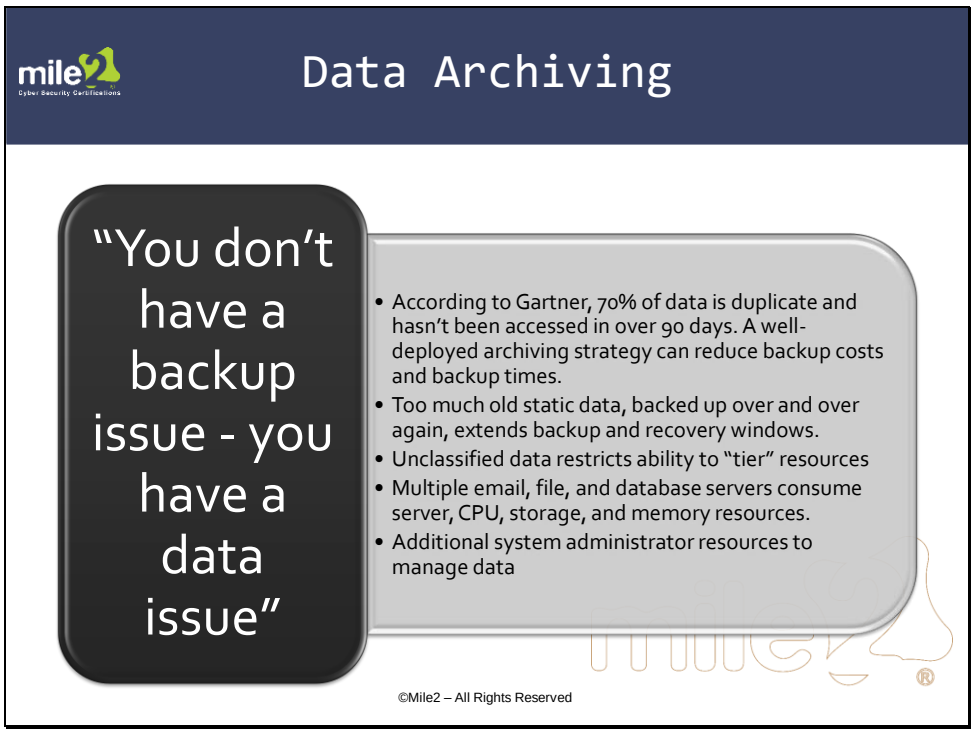
Data Archiving
"You don't have a backup issue - you have a data issue"
• According to Gartner, 70% of data is duplicate and hasn't been accessed in over 90 days. A well-deployed archiving strategy can reduce backup costs and backup times.
• Too much old static data, backed up over and over again, extends backup and recovery windows.
• Unclassified data restricts ability to "tier" resources
• Multiple email, file, and database servers consume server, CPU, storage, and memory resources.
• Additional system administrator resources to manage data
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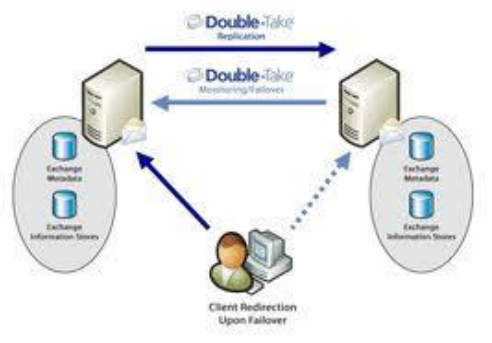
Systems Replication

For those systems that are critical, or physical recovery is a challenge, consider host replication; no recovery required, very high availability



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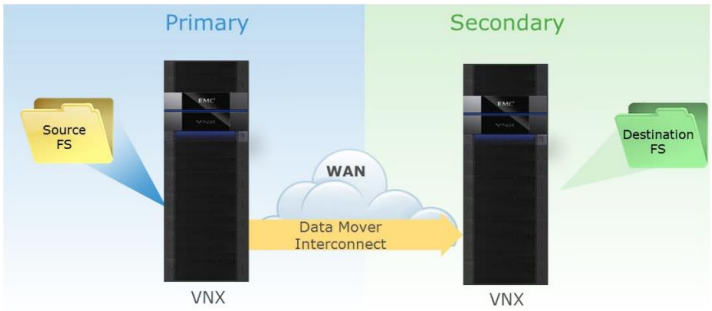
SAN Replication

Replicating individual hosts can quickly become expensive. If more than a few systems, look to a SAN replication solution, especially if you have a SAN with a compatible instance at your DR location.



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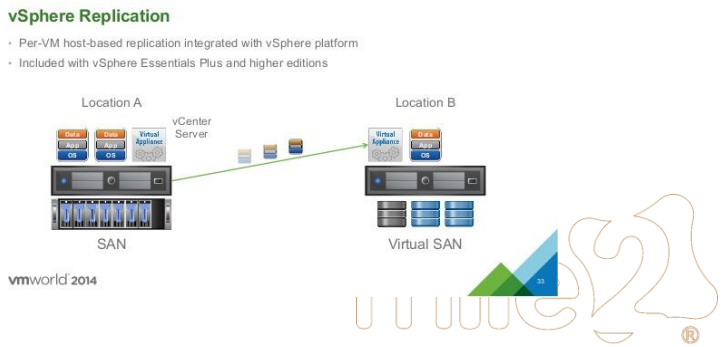
Virtual Server Replication

If you don't have a SAN or have dissimilar storage at your DR site, consider virtual machine replication. Several offerings on the market can replicate your VMs to your private DR site or cloud providers.



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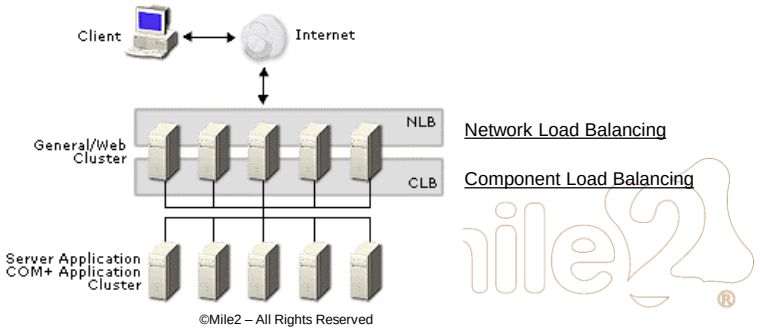
Application Redundancy

For the applications of highest importance, geographical redundancy or clustering (Grid) will reduce or eliminate outages due to failure

Examples: Exchange 2010, Oracle Real Application Clusters, SharePoint clustering



Network Load Balancing

Component Load Balancing

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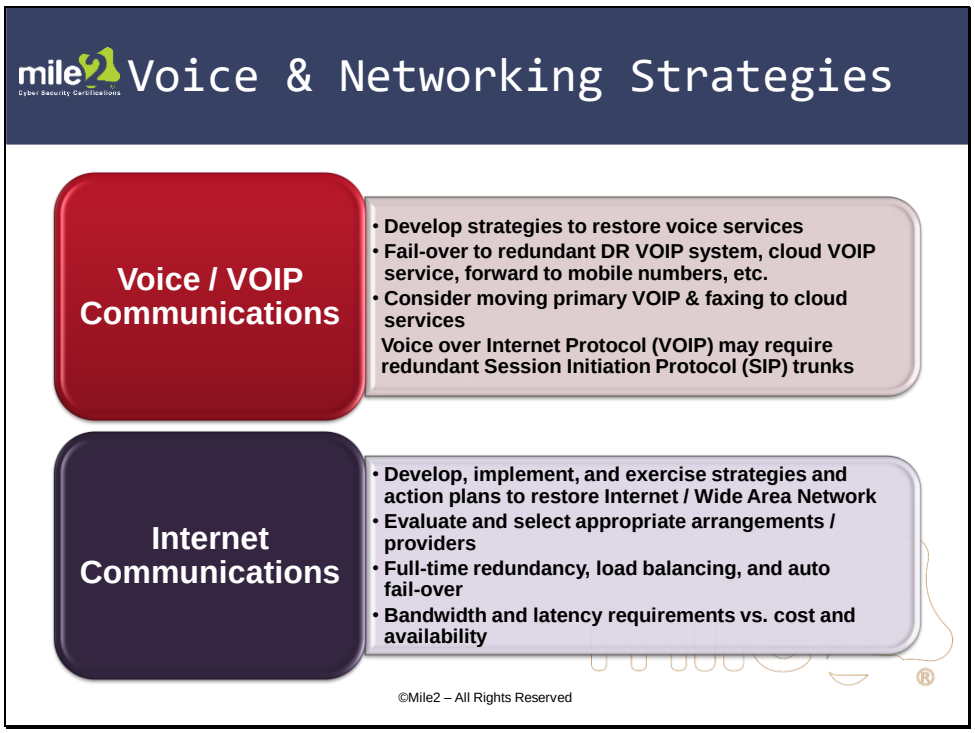
Voice & Networking Strategies
Voice / VOIP Communications
• Develop strategies to restore voice services
• Fail-over to redundant DR VOIP system, cloud VOIP service, forward to mobile numbers, etc.
• Consider moving primary VOIP & faxing to cloud services
Voice over Internet Protocol (VOIP) may require redundant Session Initiation Protocol (SIP) trunks
Internet Communications
• Develop, implement, and exercise strategies and action plans to restore Internet / Wide Area Network
• Evaluate and select appropriate arrangements / providers
• Full-time redundancy, load balancing, and auto fail-over
• Bandwidth and latency requirements vs. cost and availability
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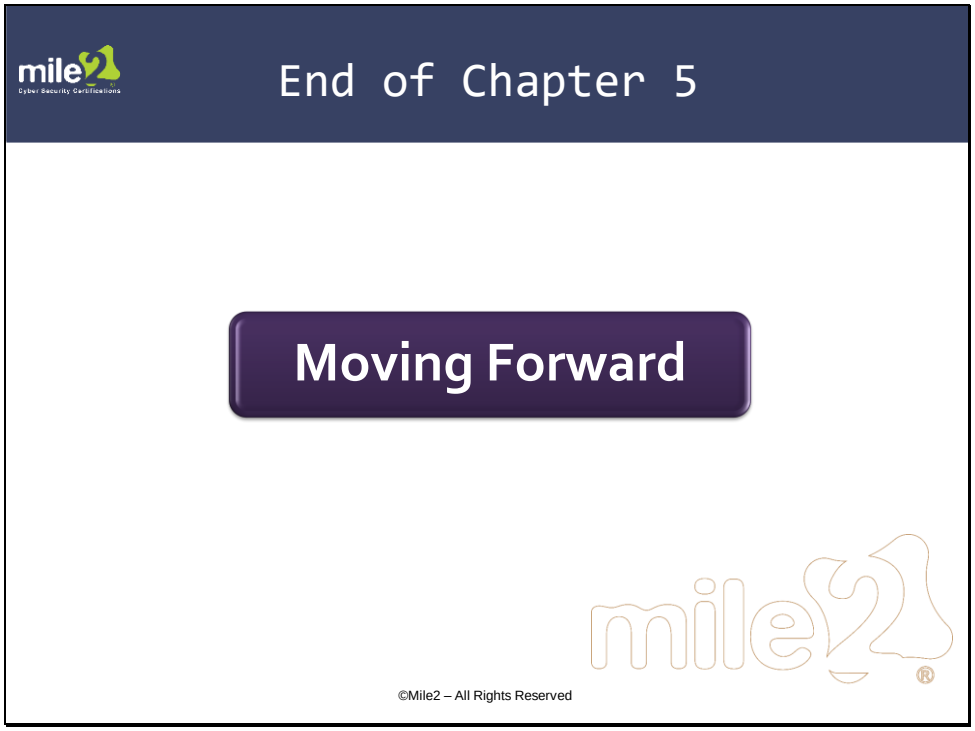

Questions and Answers

Review Questions:

1. IT recovery plans include restoration or recovery procedures designed to meet ____ & ____, as defined in the Business Continuity Planning.
    A. Recovery Point Objective & Recovery Time Objective
    B. Annual Loss Expectancy & Threat Analysis
    C. Exposure Factor & Asset Values
    D. Policy & Standards

2. Which are objectives of DR Plan Development?
    A. Minimize interruptions to the business's ability to provide products and services
    B. Minimizing quantitative and qualitative loss of a business
    C. Able to resume critical operations within a specified time
    D. Executing recovery of services in order of priority assigned to them
    E. All of the above

3. True or False: Each application process or technology has a restoration / recovery plan designed to meet RTO & RPO as defined in the BCP.
    A. True
    B. False

4. Which are included in the IT recovery plan?
    A. IT Recovery Team member names
    B. Inventory of IT equipment and materials
    C. Key recovery tasks
    D. Vendor contacts
    E. All of the above

5. True or False: Preventative Controls are a valid Recovery Strategy.
    A. True
    B. False

Answer Key:

1. A
   IT recovery plans include restoration or recovery procedures designed to meet recovery point objective & recovery time objective.

2. E
   All of these options are objectives of DR plan development.

3. A
   True. Each application process or technology has a restoration / recovery plan designed to meet RTO & RPO as defined in the BCP.

4. E
   All of these options are included in the IT recovery plan.

5. A
   True. Preventative controls are a valid recovery strategy.