Consolidation Case Study
Microsoft IT Project Carnation

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Microsoft® IT

Company Overview

- Microsoft IT
  - Manages all IT apps and infrastructure
- Total Storage Managed: 13 PB
- TB per Admin: 900TB
- Storage Utilization: 71%

Total Servers Managed

- Number of apps: ~2500
- Total Server count: ~17,000

All numbers reported monthly to management

Overview

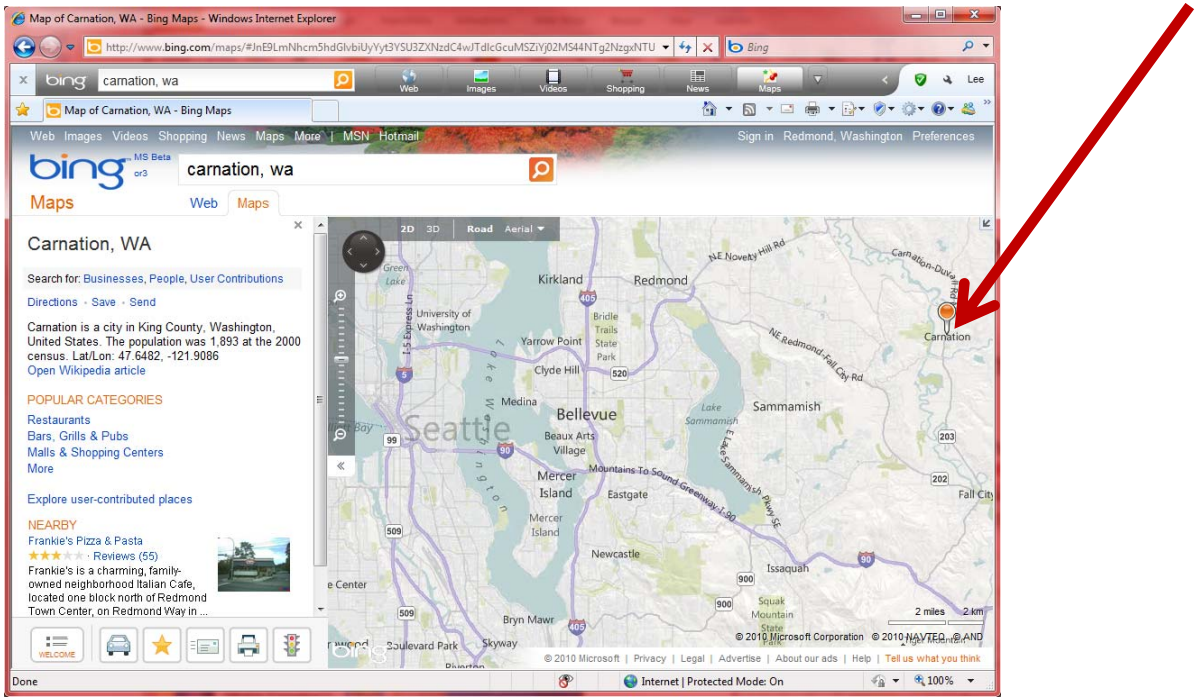
- Problem Statement
  - Real world numbers
  - Presentation to Execs
- Implementation Summary
  - Storage Architecture
  - Technologies Used
- Post Mortem – Lessons Learned

Problem Statement

- Victim of our own success
  - 250+ Storage Mid-Range Arrays
    - Too many objects to monitor
    - Too many firmware updates to manage
  - Mid-Range Array Uptime Roulette
    - 4x9s X 250 arrays = 1 outage per month
  - 6 Datacenters Worldwide
- 40% of Storage Arrays EOW
  - $3M warranty bill coming up
- Datacenter Space Constraints

What is “Carnation”?

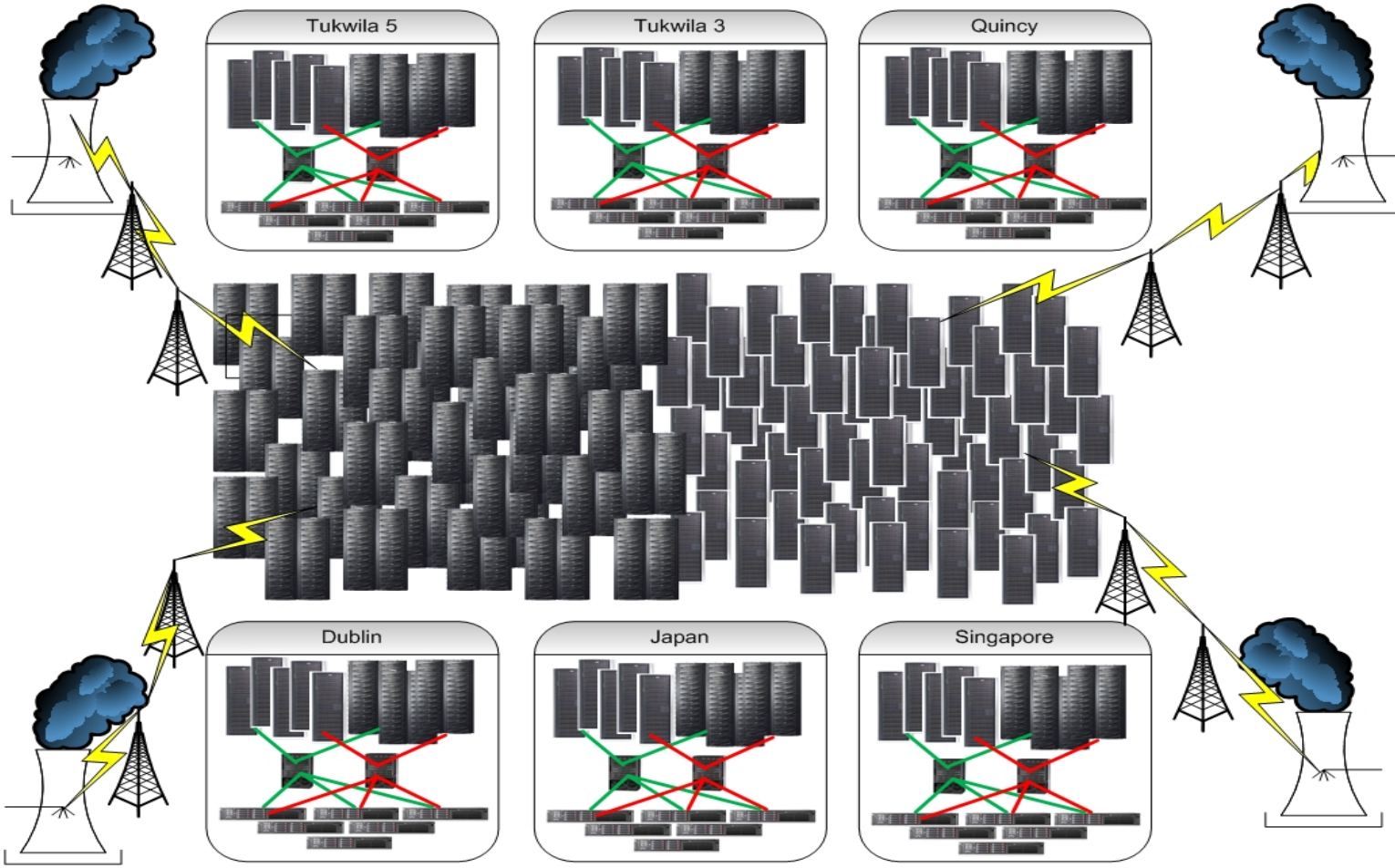
- Carnation: A city in Western Washington
- Why “Project Carnation”?
  - Power saved could power the city for 1 year



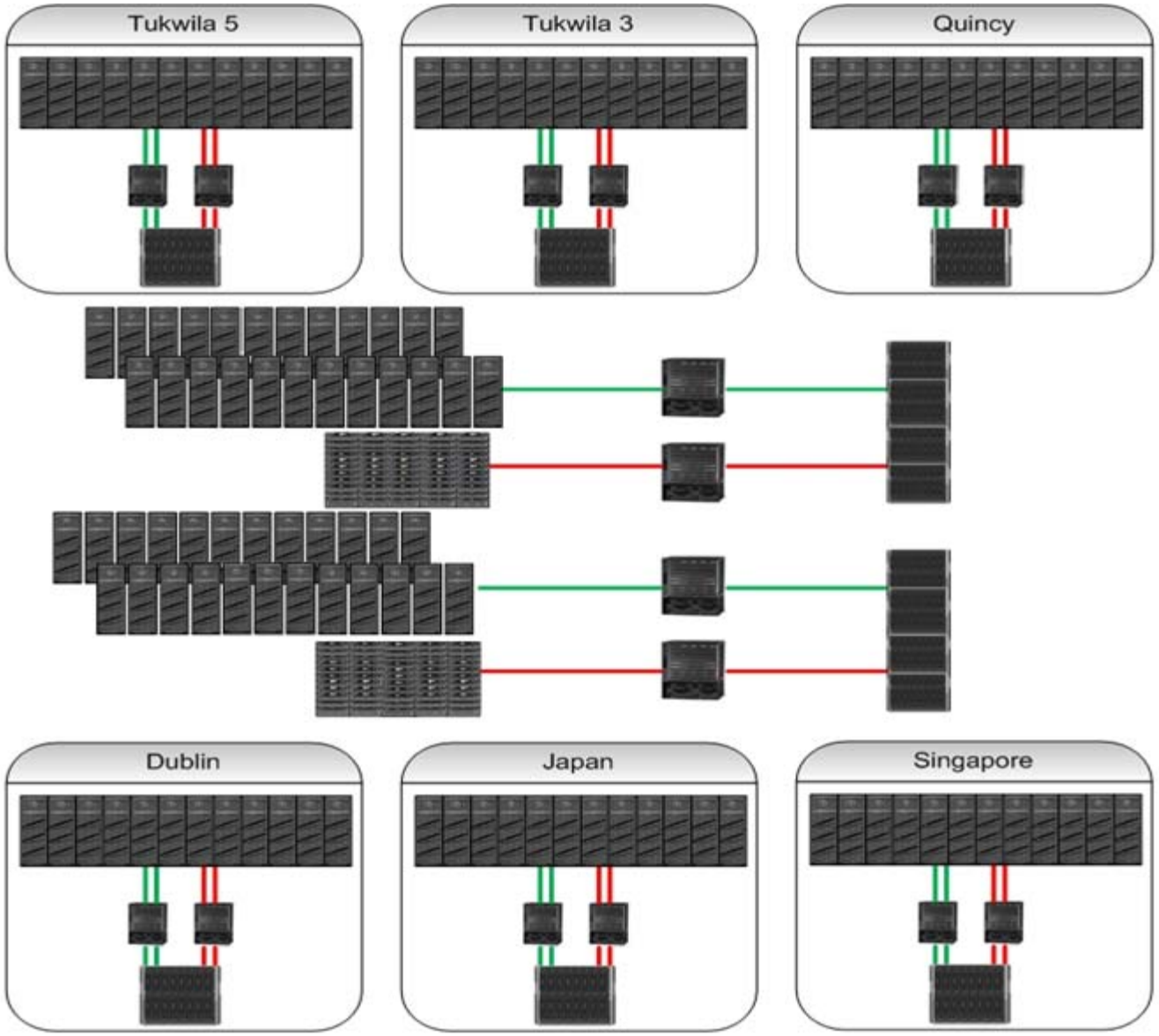
Technology Overview

- Design Principles
  - Reduce the number of managed objects
  - Upgrade from mid-range to enterprise storage
- Specific Technologies
  - Higher Density HDDs
    - 450/600GB vs. 73/146GB
  - Storage Array Virtualization
  - Thin Provisioning
  - Host-based migration software
    - Host-side storage virtualization
    - Allow hosts to migrate independently

Old Environment



New Environment

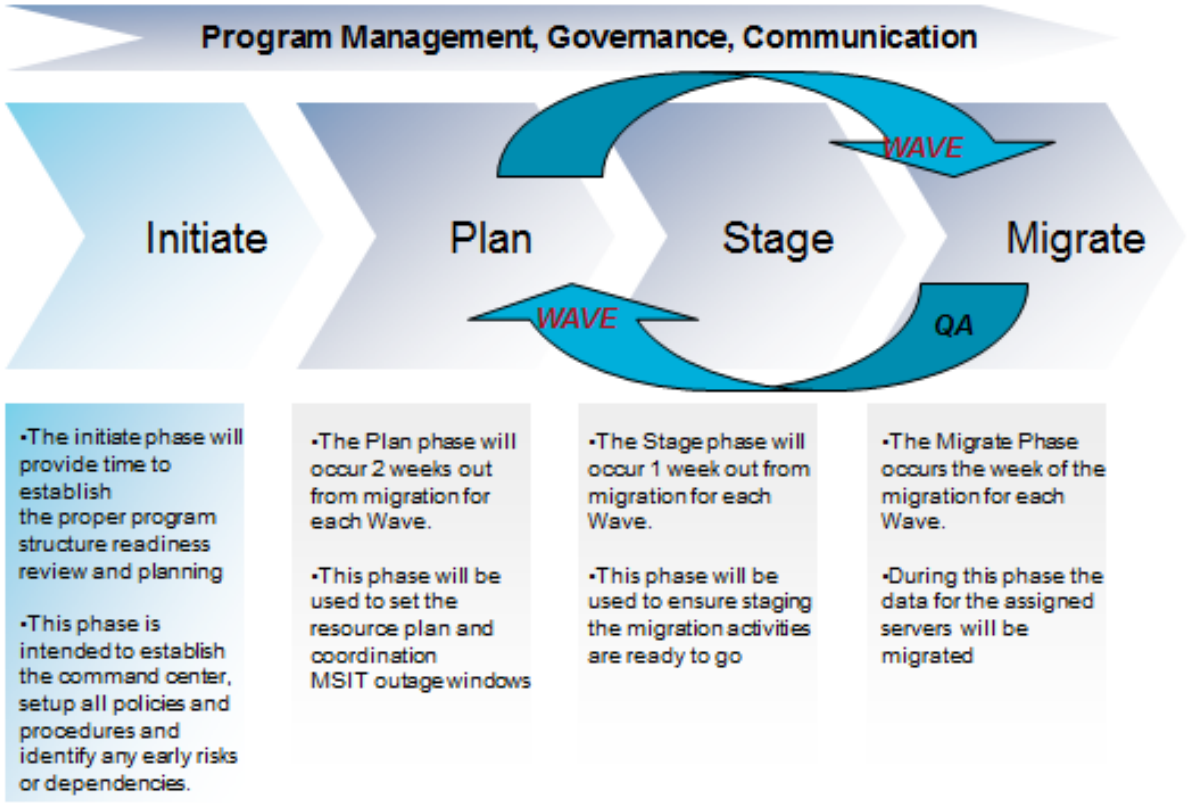


Success Metrics

Metric	Old	New	Net Savings	
			Actual	Percentage
Number of Arrays				
Mid-Range Arrays	211	3	208	98.6%
Enterprise Arrays		8		
Raw Storage (Petabytes)	7.0	6.6	0.4	5.7%
Physical Hard Drives	35,895	14,472	21,423	59.7%
Racks	295	77	218	73.9%
Energy (kVA)	1034	406	628	60.7%
5 Year Total OPEX				26%

Migration Process

- Lather, rinse, repeat…



Lessons Learned

- Issue #1 – Data Security
- Issue #2 – Performance Tiers
- Issue #3 – Scheduling Migrations

Issue #1 – Data Security

Problem: Disposing of 34,000+ hard drives

Resolution:

1. Data-erasure services built into proposal
2. If erasure fails, physical destruction
3. Erased HDDs recycled by vendor

Issue #2 – Performance Tiers

Problem: Some apps have high performance requirements

Resolution:

1. Define “Performance Tiers”
2. Baseline performance of every attached host

Tier	Description	I/O Threshold	Price
1	Dedicated space	>5000 IOps >80 MB/s	Straight pass-through + consulting cost
2	Shared RAID-1 (400 disks @ RAID-1)	750-5000 IOps 40-80 MB/s	3x shared RAID-6
3	Shared RAID-6 (400 disks @ RAID-6)	<750 Iops <40 MB/s	Standard price per GB

Issue #3 – Scheduling Migrations

Problem: Managing downtime windows on tens or hundreds of apps per array is problematic.

- Some array retirements held up by a couple of key apps

Resolution: Work closely with individual business teams, get executive sponsorship and regular visibility.

Future Strategy

- Project Duvall?
  - Migration off EOW/EOL Servers
  - Consolidation using OS Virtualization
- Project Monroe?
  - Replacing EOW/EOL Storage Network
  - Migration to 8Gb FC
  - FCoE?

Questions?

- More about Microsoft IT…

  Real world IT case studies

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