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- 1991-June 2000: Ohio Northern University (Advanced Robotics and Automation)
- 1998- Summer: Proposal for the Design Data Management System
- 1999- Summer: NASA-JSC Directors Grant for Virtual Simulation
- June 2000- 2011: Indyne, Inc. at NASA-JSC (Pro/E User, Intralink Administrator, Workflows, Training, Operations Lead, Supervisor, Senior Systems Engineer)
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- The Frugal Times
- Historical Upgrade Process
- Planning for Possible Constraints
- PTC Compatibility Matrix
- In-Place Upgrade Process
- Pre-Upgrade Activities
- Upgrade Activities
- Post Upgrade Activities
- Results of the Upgrade
- Tips for an Upgrade On a Shoestring Budget
- Questions

- **Economic uncertainty**
 - Economy
 - Continuing Resolution
 - Shift to commercial space flight
- **Budget restraints**
 - Personnel reductions
 - Environment reductions
 - New equipment guidelines
- **Still need to maintain corporate operations**
 - Operations for Johnson Space Center
 - Managing engineering data for International Space Station flights
 - Operations for general research
 - Managing engineering data for Multi Purpose Crew Vehicle (MPCV)
 - Staying current with software and hardware

DO
MORE
with
LESS.

I want you



to be FRUGAL



- Purchase/ obtain new servers for the upgraded environments
- Establish additional network and storage resources
- Establish the new system environments
- Integrate Active Directory (AD) authentication with webserver
- Load Windchill and integration custom code
- Run WinDU reports and repair data if needed
- Load systems with production data
- Regression test systems
- Train users
- Perform many runs against the database
- Release system to users



(8.0 to 9.1 took 15 months to complete)

Things to Consider:

- **Age of the current hardware**
 - Speed and capability of the current servers to support new software
 - When is the refresh planned
- **Technological Changes**
 - Traditional racked servers?
 - Virtual servers local?
 - Virtual servers remote?
 - Cloud services?
- **Budget challenges**
 - Reduced services
 - Reduced personnel
 - Customer initiated paradigm shift
- **User Environment**
 - Constantly changing with no control of the changes and their timing



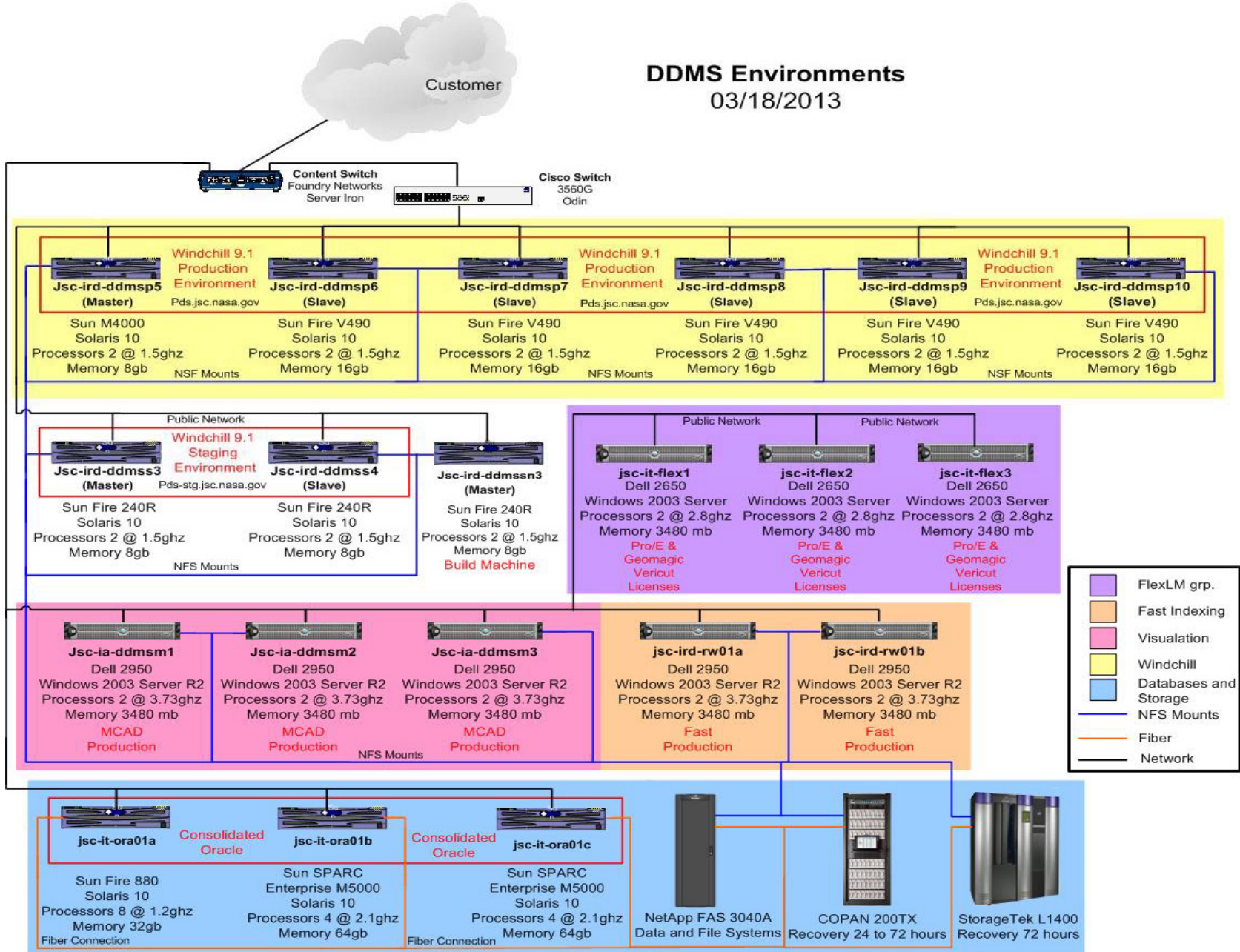
- **Corporate events**
 - Management tasks
 - Contracts changing
 - Personnel changes
 - Environmental changes
 - Policy changes
- **Software compatibility between:**
 - Current and upgraded PDMLink system
 - CAD software and PDMLink
 - Web browser and CAD software
 - Workstation OS and web browser
- **Critical software release dates**
 - Contracts using the system
 - Major events with projects
 - User training
 - PTC release dates

Quick View

PDMLink 9.1 M50 Current	PDMLink 9.1 M50 Transition	PDMLink 10.1 M30 Upgraded
Solaris OS 10 03/05	Solaris OS 10 08/11	Solaris OS 10 08/11
Java 1.6.0_18	Java 1.6.0_33	Java 1.6.0_33
Oracle 10.2.0.4	Oracle 11.2.0.3	Oracle 11.2.0.3
DS 1.2	DS 1.3	DS 1.3
Tomcat 6.0.20	Tomcat 6.0.20	Integrated in Method Server
Apache 2.2.15	Apache 2.2.21	Apache 2.2.21
CAD Workers WF4	CAD Workers WF5	CAD Workers Creo 2

Reference: [Windchill90M080SoftwareMatrices081909.pdf](#)

DDMS Environments 03/18/2013



All activities performed in all existing environments

- **Pre-upgrade Activities**

- Run WinDU reports to insure data transferability
- Upgrade server
- Upgrade Windchill components
- Upgrade database
- Build migration installation

- **Upgrade Activities**

- Move migration installation
- Run migration tool
- Upgrade Apache
- Test upgrade

- **Post Upgrade Activities**

- Establish keyword index
- Bulk publish viewables
- Rerun WinDU reports

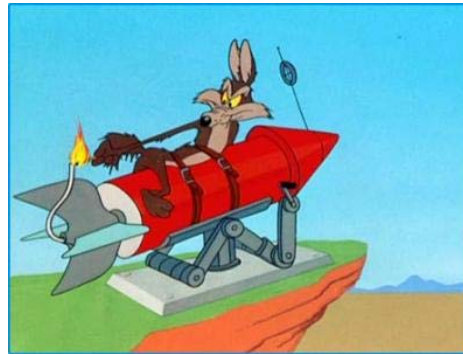
All performed in place on existing environments

- **Run WinDU reports**
 - To insure data integrity for migration
 - Roughly 14 million objects including Apollo, Shuttle, Station to Multi Purpose Crew Vehicle (MPVC) or Orion
- **Upgrade server**
 - Solaris upgrade from version 10 03/05 to Solaris 10 08/11
 - Upgrade file system to ZFS for file system and volume management, snapshots and clones, continuous integrity checking and automatic repair
 - Java upgrade from 1.6.0_18 to 1.6.0_27 for compatibility and security
- **Upgrade Database**
 - From Oracle 10.2.0.4 to 11.2.0.3+
- **Build Migration Installation**
 - To be used for the upgrade manager
 - Testing the upgraded customizations
- **Directory Service (DS) Upgrade**
 - From 1.2 to 2.3
- **PSM Install**
 - Monitor usage before and during rollout
 - Tuneing of the new system
- **MCAD Workers Upgrade**
 - From WF4 to Creo2
- **Customizations Upgrade**
 - From 9.1 M50 to 10.1 M30
 - Minimize moving forward customizations



- **Move 10.1 System**
 - Move to the master servers file system for speed
 - Can be done on a live system
 - Live system is stopped once to test migration system
 - Test functionality

- **Apache Upgrade to 2.2.21**
 - Place in environment
 - Test for functionality



- **Run Upgrade Manager**
 - Backup database and code base
 - Redirect resources between 9.1 and 10.1 PDMLink
 - Run upgrade
 - Test upgraded system

- **Viewable Regeneration**
 - Bulk publish all the CAD objects in the system
- **Indexing Generation**
 - Reindex the system with SOL (new indexing software)
 - Documents first
 - Larger files second
 - Zip and last
- **WinDU Reports for 10.1**
 - Run to insure data integrity after upgrade
 - Create a baseline for future loads
- **Resource Return**
 - Return virtuals used for upgrade
 - Return storage copies used for upgrade



- System outage started on **Thursday April 4th** at 5:00pm
 - Ended on **XXXX**
- Backups ran from **xxx** to **xxx**
- Upgrade Manager ran from **xxx** to **xxx**
- Regeneration of Viewables
 - ran from **xxx** to **xxx**
- Regeneration of Keyword Index Status
 - **XXX**
- WinDU Reports for 10.1 results
 - **XXX**



- Upgrade current system components in place avoiding the purchase of new hardware
- Migration environment can be a virtual machine zoned on one of the existing servers
- Transferring the migration environment to the same server as the environment to be upgraded eliminates all the network slowness
- The only extra resource needed was the storage for the production database and for the data to be placed against the staging environment for a one to one comparison run against the production environment.
- Coordinate the upgrade with everyone from the users to management to avoid scheduling pitfalls and software incompatibilities
- To use the updated DS with 9.1, you will have to obtain a “fix” from PTC



- Upgrade





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