ClusterProven and Advanced ClusterProven on xSeries Validation Process

ClusterProven on xSeries Validation Process Table of Contents

1 Introduction

1.1 Overview

IBM's xSeries and Netfinity® ClusterProven™ Program is a major initiative by IBM to raise the high availability bar. This initiative creates meaningful partnerships with application developers (AD) who want to achieve these new high standards. This program once again extends IBM's tradition of support and opportunity for its partner application developers and builds a foundation for complete solution performance. The ClusterProven Program opens the door for hundreds of developers trying to respond to the demands of e-business by leveraging major gains in the high availability and scalability of IBM Clustered Servers. Whether customers choose our IBM eServer xSeries or Netfinity midrange, high-end or enterprise class servers, they can leverage leading-edge clustering technologies and availability achievements. The new standards of high-availability applications can be applied to any combination of operating system, middleware and end-user applications. An application meeting the technical criteria will be validated with xSeries and awarded the program valuemark.

1.2 Objective

The purpose of this document is to describe the validation process. This document explains the qualifications required to join the program, the technical criteria for the two levels of the program and the validation process used to measure an application's eligibility for the ClusterProven valuemark.

1.3 Program Level Description

The ClusterProven program is an IBM cross brand initiative to leverage cutting-edge IBM clustering technologies to improve the availability of today's critical business applications. As availability requirements become more stringent and critical to the profitability or productivity of many organizations, it becomes increasingly important to have all the necessary pieces of an availability solution in place. In e-business availability becomes even more critical, because the server is expected to be online for 24 hours a day, 7 days a week and the financial losses, associated with downtime effect the company's profits and image.
These solutions must address both planned and unplanned outages, efficiency in systems management and data protection in a comprehensive fashion.

For systems to achieve continous availability operations, all the system components - end user connections, processors, memory, disk drives, networks, middleware, application software and system communication - must be virtually outage-free or implemented in a fashion where failures are transparent to the end-user. In addition, mechanisms need to be in place to allow maintenance of the system without disrupting the current workload. As such, it is important that high availability solutions address these availability design points.

The ClusterProven on xSeries program is committed to delivering highly available and continuous availability solutions for our customers. We are working with industry leading software developers with applications that address the dynamically changing needs of business critical operating environments.

To join the program and become eligible for using the "ClusterProven or Advanced ClusterProven" status, it is necessary to meet the following guidelines:

1 identified as an alliance partner
2. satisfy the technical criteria outlined in this document
3. application is cluster-aware and generally available for customer to purchase
4. clustering installation and configuration instructions are documented and available to customers
5. software developer is a good partner willing to engage in joint marketing programs
6. service and support infrastructure available to handle customer issues
7. signs a ClusterProven Trademark Use Agreement

1.3.1 ClusterProven Criteria

An application that meets the technical criteria below can be validated on a xSeries or Netfinity server and registered as **ClusterProven** if the application:

- can switch over to an alternate cluster node when the primary system becomes unavailable

- gracefully recovers in case of a hardware or software failure

Graceful Recovery implies:

*maintains application availability in the event of failure

*failure recovery with minimal impact to application availability at end-user level

*data integrity preserved during failover - doesn't imply guard against data loss

The **Advanced ClusterProven** status is intended to denote applications and solutions that leverage Netfinity and/or xSeries clustering technologies to move customers closer to continuous availability. The Advanced ClusterProven category provides increased benefits above the ClusterProven status and further improves the availability and performance of the cluster, eliminates downtime for planned and unplanned outages and allows the user to easily manage their cluster. **NOTE:** Not all SPC are enabled to support Advance ClusterProven testing Please check the web at **http://www.developer.ibm.com/xseries/centers.html** for a listing of supported centers. In order to achieve Advance ClusterProven status, a solution must meet **two** of the technical criteria below:

- Operate in a Microsoft Window 2000 Datacenter OS

- Operate in or enable Linux clustering

- proactive notification prior to failure

- automatic corrective action when application or server condition become marginal

- application monitoring

- application recovery with no loss of in-flight data or transactions (up to client applications)

- dynamic or manual workload balancing

- further reduction of costly downtime for planned or unplanned upgrades

  - ability to have systems coexist at different software release levels

  - ability to dynamically vary systems on or off-line

  - robust recovery models that make failures transparent to end use

1.4   Program Implementation Process

The goal of the ClusterProven program is to validate and document high availability applications for our xSeries and Netfinity platforms. Applications that complete the ClusterProven process are documented on a standard checklist. A copy of the checklist is available in Appendix A of this document. This checklist is used to document the application information, hardware description and application developer's support center details. The information in this checklist is made available to our service and support center only for purposes of customer support and presales information.

Upon approval of the submitted checklist, IBM will submit application to the Global Solutions Directory. ClusterProven and Advanced ClusterProven solutions will be identified in the IBM Global Solutions Directory, accessible online by IBM sales teams, resellers and customers. Cooperative marketing programs, joint collateral and a ClusterProven valuemark are available to ISVs who complete the engagement. Once signed, the IBM ClusterProven agreement will be maintained by IBM Contracts Administration and ClusterProven Program Manager. All contractual issues must be resolved and contracts signed before clusterproven logo is awarded

1.4.1   Roles and Responsibilities

SPC Technical Consultant:
- Setup and configure high availability hardware, OS and middleware
- Documents cluster platform configuration
- Provides first level of support IBM hardware and clustering middleware
- Verifies test results and assist ISV in completing ClusterProven checklist

or Application Developer Lead Technical Interface
- Possess a good understanding of high availability and supported clustering middleware
- Installs application and configures for cluster environment
- Executes and manages validation testing as described in section
- Provides additional applications or load utilities unless prior agreement made with IBM to provide
- Resolves all agreed to application related problems

1.4.2   Service and Support

All participants in the program will be asked to sign a ClusterProven trademark use agreement. This agreement includes the rules for placing the trademark on products and promotional materials; it also states the limitation and responsibilities of IBM and the for service and support of customers. The IBM Helpcenter will use a "cold transfer" process to handle customers support calls. Under this model, the HelpCenter will problem determine up to the application. If the application is the problem customer will be given the name and telephone number of the Application Developer's HelpCenter Support Representative that is provided in the application developer's checklist.

A registry of ClusterProven and Advance ClusterProven applications will be maintained in the Global Solution Directory located at www.developer.ibm.com.

1.4.3   Validation Assumptions/Dependencies

Assumptions:
1   Tested application is generally available an installed in at least 1 customer location
2   All software components excluding cluster middleware is provided by application developer
3   Application is "cluster aware"
4   Application's clustering installation and configuration instructions are documented and publicly available
5   Application runs under at least NT SP 4 with Y2K readiness update applied.
6   Pre-port assurance review has been held

Dependencies
1   Application developer's technical representative is knowledge of hardware and clustering implementation
2   Application developer's requirement for the following are documented:
   - application's installation instructions
   - minimum and maxium system processor
   - minimum and maximum memory required
   - number of drives required in each system to store boot devices, NOS and Middleware
   - RAID levels of unshared internal drives
   -

2 ClusterProven Validation Checklist

2.1 Validation Overview

The goal of the xSeries and Netfinity ClusterProven validation document is to provide application developers with guidelines for validating their applications in a high availability environment on our xSeries or Netfinity servers. This document will serve as the formal validation guidelines and will be used to evaluate an application's readiness for ClusterProven and Advanced Clusterproven valuemark. The IBM ClusterProven platforms below are selected based on expected customer deployment and the application developer's hardware requirements. The information below is intended to be a subset of evaluation guidelines and can be used in conjunction with the application developer's own evaluation tools. Regardless of whether an application is verified as meeting the criteria herein, or whether IBM has accepted such verification, no right to use the trademarks is granted until both parties have signed the ClusterProven Trademark Agreement.

Below is a matrix of possible cluster hardware platforms which are listed on Microsoft clustering hardware compatibility list that will be available in our Solution Partnership centers to validate clustering solutions.

IBM ClusterProven Platform Configuration Matrix			*NF or xSeries (2 way SMP)*	*NF or xSeries (2-4 way SMP)*	*NF or xSeries (4 way SMP)**
Shared Storage Subsystem.	**SCSI Non-Redudant** IBM EXP15, FaST200 Enterprise Storage	NT 4.0 Enterprise Edition SP 3 or higher Windows 2000 Advance Svr.	✓		✓
	SCSI Dual Adapters IBM ServeRAID 3H or higher and IBM EXP 15		✓	✓	✓
	IBM Fibre Channel Solution single adapter, single		✓	**x**	**x**
	Redundant IBM Fibre Channel Solution, redundant adapters and contollers with IBM FaST 200		**x**	✓	✓

Legend:
    ✓ = test configuration
    x = configuration not tested

* High Availability Guarantee 99.9% configuration available for testing on the 4 way servers only

2.1.1 Validation Schedule

Activity	Expected Duration
Validation Site Preparation	2-5 days
Application Install	1 day
Validation	2-5 days
Problem Resolution	1-2 days
Results Verification/Paperwork	1 -3 days

2.2 ClusterProven Testing Objectives:

The objectives of the Clusterproven validation process is to evaluate the high availability functions, failover and failback capabilities, ease of integration with other applications, and recovery of applications in the event of a failure. The selected validation exercises are designed to place the solution in an environment that is similar to actual customer implementations. Below is a description of the validation objectives and the criteria for evaluating pass/fail status. Section 3.2 contains a detailed description of each of the validation exercises.

- **Application installation**

The objective of this portion of the test activity is to ensure that the product can be installed from a new installation package, or normal maintenance package, and that the overall functional capabilities described in the UserGuide or installation instructions are included. There will also be an additional test to check the software ability to install from a network or in an unattended mode.

Pass/Fail Criteria
  - ✓ product installs from a new installation package, or normal maintenance package,
  - ✓ documentation adequately describes installation process in HA environment
    - *including any helpful installation and configuration tips*
  - ✓ unattended installation (if offered by solution provider) works

- **Functional test of the application with the cluster platform**

The objective of this test is to exercise both the features of the application, including the automatic failover and automatic failback, application's recovery state from hardware and software induced failures, client-reconnect state, and robustness/high-availability characteristics.

Pass/Fail Criteria
  - ✓ application launches properly
  - ✓ application recognized as appropriate resource in high availability environment
  - ✓ automatic failover occurs in the event of an unrecoverable failure
  - ✓ application failover doesn't bring the cluster down
  - ✓ application restarts on surving node
  - ✓ data integrity preserved during failover (but this doesn't imply guarding against in-flight data loss)
  - ✓ application is fully functional after hardware-induced failures (i.e. pulling cables or drives)

- **Integration of applications with other applications in the cluster**

The objective of this portion of the validation is to ensure the cluster application can run concurrently with the applications needed to support the hardware configuration that has been chosen. The first is APC Power Chute software for control and monitoring of all of the UPS's as well as the enabling of software shutdown in the case of power failure. The second is the IBM ServeRAID Administration utility for Windows NT, Windows 2000 and Windows 95. This utility enables monitoring and configuration of the IBM ServeRAID adapters, the hardfiles under its control as well as to support rebuild of the non-shared logical drive in case of defective hardfiles without having to the operating system. The third is the IBM Director systems management software for managing and monitoring the hardware and some system software components. **Optional**: The Simplicity storage manager which is installed on each node of the cluster to support the configuration and access to fibre channel storage.

Pass/Fail Criteria
  - ✓ installation of the application doesn't bring the cluster down or cause the other applications to fail
  - ✓ all software installs to the C: drive and runs concurrently.

2.3 Evaluating the Solution

This section describe the procedures used to evaluate solutions for the ClusterProven valuemark. The information provided here only represents one scenario. Application developers can substitute test cases as long as these test cases meet the technical criteria outlined in section 1 above. Each of the exercises should be run independently and introduced in a logical order. This testing will exercise both the features/functionality of the application including application installation, automatic failover and automatic failback, manual state changes as well as the robustness/high availability characteristics of the solution. Testing should involve data throughput on the shared DASD (disk) devices as well as the public (client accessible) networks.

2.3.1 Application Installation

Application should be installed as directed by installation instructions contained with product packaging or electronically accessible via worldwide web. Readme file will be reviewed for latest instruction and patch information. Software installation should be conducted in an unattended mode where available. If secondary application(s) are required, the application version level and order of installation should be described in the SD's instructions. SD is responsible for providing the necessary applications and install instructions.

2.3.2 Application Functionality

The standard failover/failback test will be run using the following methods to initiate a failure. These will simulate a wide variety of possible failure conditions that the customer might actually experience.

shutdown a node
power off a node
hit the reset button on one of the nodes
shutdown and restart a node
stop the cluster services on one of the nodes
stop the application services on one of the nodes
create a "Stop" error on one of the nodes
remove one of the public network cables for one of the nodes
failure of a hardfile in a RAID 1 or 5 array
failure of 2 hardfiles in a RAID 1 or 5 array. (Caveats: Hot spare is setup and the failures occur far enough apart for redundancy to be restored after the first hardfile is lost.)

Standard failover/failback test on both nodes is conducted using the following procedure:
1. Create a single virtual file server group with the following resource
      - an IP address resource for each public network attached to the cluster
      - a network name resource for each public network attached to the cluster.
      - several physical disk and/or fault tolerant disk resources reflecting the partitions
        setup on the shared storage enclosure hardfiles (not including the Quorum disk)
      - several file share resources

2. Setup the cluster with the cluster administrator such that Node A owns all the groups and is preferred   owner of all groups

3. Setup all groups in the cluster to allow failback immediately

4. Start two clients per segment, each against its own unique file resources for each shared storage drive (except for the Quorum disk).
        NOTE: non-shared drives will not be exercised

5. Allow clients to run for 5 minutes at which time the failure will be created on node A.   The expected behavior at this time is that either all groups (or some subset of groups depending on

the method used to create a failure) will failover to NodeB, and that all clients after reporting some errors will reconnect to the cluster and continue running within one minute.

6. Allows clients on NodeB to run for another 15 minutes after which time the failure on NodeA will be corrected. Expected behavior at this time is that all groups owned by NodeB will move back to NodeA and that clients, after reporting some errors will reconnect to the cluster and continue running within reasonable time.

7. Repeat above with NodeB as preferred owner of all groups.

2.3.3 Integration of Application with other applications in the cluster

Various support applications need to be installed to support the cluster platform. The first is APC Power Chute software for control and monitoring of all of the UPS's as well as the enabling of software shutdown in the case of power failure. The second is the IBM ServeRAID Administration utility for Windows NT , Windows 2000 and Windows 95. This utility enables monitoring and configuration of the IBM ServeRAID adapters, the hardfiles under its control as well as to support rebuild of the non-shared logical drive in case of defective hardfiles without having to exit Windows environment. The last application that may be running is the Simplicity storage manager which is installed on each node of the cluster to support the configuration of and access to the fibre channel shared storage. All software will be installed to the C: drive and tested to run concurrently without problems.

2.3.4 Cleanup

All outstanding problems or issues with the solution should be resolved before the final results are entered in on the ClusterProven checklist.

2.3.5 Regression

Any major code changes to the application, i.e. fixpacks, version updates or service packs should be regressed before final results are audited and posted to the GSD database. To accomplish this, previous scenarios that have caused problems during the engagement should be rerun. Major code changes also require a new validation in the future.

2.3.6 Results Verification/Posting

If the SPC was used to validate the solution then the Technical Consultants and ISV developer will be responsible for updating the final results in the online Checklist. For "at home" validation the brand Technical Consultants will update the final results on the checklist. Once the results are updated, the ClusterProven Program Manager will review results and provide ClusterProven logo to the ISV. **Granting of logo is dependent on the ISV signing the ClusterProven agreement.**

3   Advanced ClusterProven Validation Requirements

NOTE: This process is not available in all Solutions Partnership Centers. Please refer to url: www.ibm.com/eservers/xseries/datacenter for more information on supported test locations.

3.1   Microsoft Windows 2000 Datacenter

Before you upgrade and test your application on a Windows® 2000 Datacenter Server, use the information below to assess the readiness of your solution.

3.1.1   Windows 2000 Datacenter Testing Terms and Definition:

Windows Datacenter Program 14 Day Test: For server platforms to be placed on the Microsoft Hardware Compatibility List (HCL), the following Windows Datacenter components must be tested over an extended period of 14 days.

- All hardware components

- All hardware drivers

- All software that works at the kernel level, including virus software, disk and tape management, backup software, and similar types of software

Microsoft requires participating vendors to set up these hardware and software components running Windows 2000 Datacenter Server and successfully run the Windows Datacenter Program tests. Vendors must successfully pass a 14-day test period during which servers running Windows 2000 Datacenter Server must meet or exceed 99.9 percent scheduled availability.

Windows 2000 Application Logo Certification - Highest level ranking for Windows 2000 Datacenter applications. The application meets the standards in the Windows 2000 Application Specification and has passed certification tests conducted by Microsoft and or VeriTest.

IBM Datacenter Application Compatibility – Applications tested for Windows 2000 Datacenter compatibility on an IBM Datacenter configuration. The application provider is required to provide Windows 2000 Datacenter documentation and contact information for the 24 x 7 support center, and agree to maintain the level of support documented and required for Windows 2000 Datacenter problem resolutions. This testing is available to the software provider at the Microsoft Compatibility Lab located on the Microsoft campus and also, beginning April 2001, at the Solution Partnership Center in Hursley, UK.

3.1.2   How do you know if your application is ready for Datacenter?

Kernel mode drivers must pass verification testing

Poorly written kernel mode drivers have the potential to crash the system. Therefore, it is critical that any application that includes kernel mode drivers, such as anti-virus products, and/or disk and tape management, etc. be thoroughly tested to minimize this risk. If your application includes any kernel mode drivers, each of these drivers must pass the ***Windows Datacenter Program 14 Day Test***. This is a rigorous 14-day Microsoft hardware compatibility test administered at the IBM Center for Microsoft Technologies facility in Kirkland, Washington. See http://www.microsoft.com/hwdev/driver/driververify.htm for more information on using the Driver Verifier Manager and diagnosing driver problems.

**Microsoft Application Specification Design Guide for Windows 2000**

Certified for Windows

The Application Specification for Windows 2000 defines the technical requirements for applications to earn the "Certified for Microsoft Windows" logo. Applications may carry the "Certified for Microsoft Windows" logo, once they have passed compliance testing and have executed a logo license agreement with Microsoft. This logo lets your customers know that your application offers a high quality computing experience available on Windows.

Windows Certification for server applications is available for any of the following operating systems:

- Windows 2000 Server
- Windows 2000 Advanced Server
- Windows 2000 Datacenter Server

The logo you receive will indicate the version(s) of Windows for which your product is certified. Sample logos are shown below.
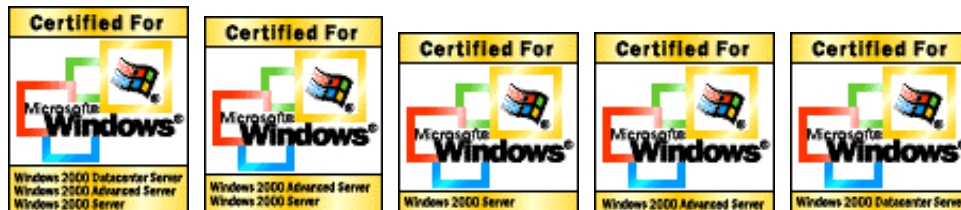
Compliance testing for the Windows Certification program is performed by VeriTest, an independent testing lab. Compliance testing will be done using the latest released versions of Windows 2000, including any service packs.

For additional information on how to test for the "Certified for Windows" logo, see http://msdn.microsoft.com/certification.

Note: To simplify the logo programs for both customers and ISVs, the requirements for the Windows 2000 Server logo will over time equal the core baseline BackOffice logo requirements. For more information on the current BackOffice logo, see http://www.microsoft.com/backoffice/designed.

References

Resource	Address
Desktop Application Specification for Windows 2000	http://msdn.microsoft.com/certification/
"Certified for Windows" Logo Program	http://msdn.microsoft.com/certification/
VeriTest Logo Lab email	LogoLab@veritest.com
Certified for Windows Logo email	Winlogo@microsoft.com
Windows 2000 Developer information	http://msdn.microsoft.com/windows2000
BackOffice Logo Program	http://www.microsoft.com/backoffice/designed

Knowledge Base	http://www.microsoft.com/support/
Microsoft Platform SDK (Software Developer Kit) Documents the Win32® and Win64™ application programming interfaces (APIs).	Provided with the Microsoft Developer Network (MSDN) Professional Subscription. To subscribe, visit http://msdn.microsoft.com/subscriptions/

3.1.3 Getting Started

1. Complete the Windows 2000 Application Logo Certification Testing

Veritest is the worldwide laboratory for the "Certified for Windows 2000 Datacenter Server" logo from Microsoft. Once VeriTest has completed the certification test, you can display the official Microsoft logo to show that your application is certified to have the highest level of reliability and performance. For more information, visit the VeriTest Web site at:
http://www.veritest.com/mslogos/windows2000/Win2k_datacenter.asp

2. Complete the compatibility or validation test on an IBM Datacenter configuration

Two locations are available to work with vendors to complete compatibility testing of your application on an IBM Datacenter configuration. You can schedule an engagement on an IBM Datacenter configuration in one of the following ways:

> Send an email to isvlab@microsoft.com or
> Logon to www.developer.ibm.com/centers and register for an available
> IBM Solution Partnership Center (limited availability centers to open in
> February 2001)

You can be confident that the IBM Datacenter solutions include certification or validation for compatibility of applications software.

3. Provide 24x7 Support Center Documentation

The ISV or application vendor must provide documentation and contact information for their 24 x 7 support center, and they must agree to maintain the level of support that they have documented. Support information should be provided on the IBM Datacenter contact letter provided in Adobe Acrobat format at: http://www.pc.ibm.com/ww/eserver/xseries/windows/datacenter.html.

4   Linux ClusterProven

This portion of the validation process document is still in development.

Appendix A
ClusterProven Checklist for xSeries and Netfinity

In order to provide our help centers, customers and resellers with helpful information, we record the results of your ClusterProven engagement on the checklist below. This checklist will serve as formal documentation of your ClusterProven validation engagement. The fields indicated in blue are required to complete your ClusterProven registration. **NOTE:** Regardless of whether an application is verified as meeting the criteria herein, or whether IBM has accepted such verification, no right to use the trademarks is granted until both parties have signed the ClusterProven Trademark Agreement.

1. Company Information and Contacts for the Clusterproven Solutions Team

Official Company Name: _____
         Address: _____
         _____
         Phone: _____   Fax: _____

Testing Contact: _____ (include address if different)
         Phone: _____   Email: _____

Marketing Contact: _____ (include address if different)
         Phone: _____   Email: _____

Technical Support Organization
Please submit separate responses for each country under which you have a technical support organization.
Technical Support Phone Number: _____
         Fax: _____   Email: _____
         Hours of Operation: _____   Address: _____
         Terms of Support: (free or fee based, etc.) _____
         Contact Name in your support organization who is aware of your participation in the ClusterProven   program:
_____

2. Your Marketing Information
In order to prepare your web page on the IBM Clusterproven Solutions web site, please provide the following information (as part of this document or separately, as appropriate):

a) Logos
Please send us electronically both your Company and Product(s) logos in *.GIF or *.JPEG format   files. Also inform us of any trademarks and/or restrictions in their use.

b) Company Overview, Product Description(s), and Contacts
Company highlights, the industry(s) served, customer set, awards won, etc. A description of the product(s) tested. Contact phone number(s), Email, and/or address for a reseller or customer to find out how to get more information about the solution.
This information should total approximately 150 words.

c) Web Links to and from Your Web Site
URL you want to appear <u>on</u> the IBM Clusterproven Solutions web site:_
    http://_____

And optionally, URL where you will have a link <u>to</u> IBM's Clusterproven Solutions web site:_
    http://_____

d) Year 2000 Readiness (Y2K)
Please provide a statement on your product's "year 2000" readiness: _____
_____

e) Languages Supported (NLS)

_____

3. Test Environment
Please submit separate responses to sections 3 and 4 for each product tested and each unique test environment.

a) Product Tested
Official Product Name: _____
Version/Release/Fixes Tested: _____
Optional Modules Installed: _____
Industry Segment: _____
    (e.g. Accounting, Distribution, Manufacturing, other...)

b) Operating System and Cluster Middleware Software Tested
Operating System: _____
    Version/Release Level: _____
    Required Fix Packs: _____
Cluster Middleware: _____
     Version/Release Level _____
Required additional Applications utilized:

_____
    (e.g. database applications [SQL, DB/2, etc.], systems management [IBM Director], etc.)

c) Server Tested *(info below supplied by IBM Technical Consultants)*
Model Name: IBM xSeries or Netfinity   _____
Type-Model: _____
BIOS Level: _____
System Processor(s):   _____ (quantity, type/speed MHz)
L2 cache: _____ (size KB)
System Memory: _____ (size MB)
Hard Disk(s):   _____ (number of drives & capacity GB)
LAN Controller: _____ (type and speed)
Additional Adapters: _____ (specify)

d) Disk Subsystem Type (*info below supplied by the IBM Technical Consultants*)
Model Name:
Drive type and size
Total number of drives in each unit
RAID Level of Drives
Number of Fibre Channel controllers installed:
        State of fibre channel controllers, i.e. : Active/Active: Active/Passive

d) Additional Hardware Utilized by your Application
If your testing included additional hardware (e.g. memory, storage devices, or adapters) in addition to that listed above, please complete the information below (as appropriate):

Manufacture's Name: _____

Device/Adapter Name and Model: _____

Manufacture's Technical Help Contact: _____

Device Driver Release Level: _____

Web or FTP Site for updates: _____

Other: _____

For Adapter,   Bus Type: _____
                          (EISA, ISA, PCI 32, and/or PCI 64)
               Number of Adapters Installed: _____
               Which server slot was tested: Worked? _____
               Applicable IRQ, I/O Range(s) tested:
               IRQ: _____
               I/O Range: _____ (repeat for additional ranges)

Application Note: Additional hardware used by your application will be mentioned on the Clusterproven web page configuration data for your product. However, the hardware manufacturer will **not** be automatically added to the Clustering Hardware Compatibility list. Please indicate if there are any adapters used in your testing which you would like to have certified as IBM ServerProven Hardware Compatible.
(See the web site for a list of tested adapters.)

e) Client Information
Number of Client Systems: _____   Number of Users Simulated: _____

CPU Type/Speed/L2 cache: _____

Memory: _____

Hard Disks: _____

Operating System (Version/Fix packs): _____

Application software used on clients: _____

f) Environment Details
Please describe details of your test environment including such things as…

Cluster Solution Configuration/Setup
(describe how cluster is configured, i.e. cluster configured as member servers or PDC and
BDC,   BIOS setting, performance monitor used to capture logs)

_____

_____

_____

_____

Storage Subsystem Setup Details: <mark>(**information below supplied by IBM Technical Consultants)**</mark>

Categories	Details
Partition	
Logical Drives	
Drives Formatted as (NTFS or FAT):	

Drives RAID level (RAID 1, 3 or 5)	
Drives Stripe Size	

4. Test Results <mark>**(information below provided by IBM Technical Consultants)**</mark>
These are general areas of testing typically performed.   Your specific test scenarios may be different, so please modify as required.

Date(s) Test Performed: _____

a) ClusterPlatform Bringup (Installation)
Were server utilities used in setup and machine preparation (e.g. ServerGuide, etc.)?
    Yes __   No __

If yes, which ones were used: _____

What was the total installation time for the solution?
    30-60 minutes __   1-2 hours __   Greater than 2 hours __

Where special steps required for installation of ClusterPlatform?
    No __   Yes __ (if yes please describe below.)

Helpful Installation Tips and References:
_____
_____
_____
_____
_____
_____
_____
_____
_____

Was unattended install used?
    No __   Yes __   Worked as described?

(Include any machine preparation tips, operating system setup tips, or hardware installation tips, if applicable. Also include any references to helpful/recommended documents and/or web sites.)

b) Functionality of the Application's High Availability Features <mark>**(information below provided by IBM Technical Consultants)**</mark>

Your solution stresses which of the following server subsystems the most?
    Cache __   CPU __   Disk __   Memory __   Network (LAN-WAN) __   Other __
        If Other, please specify: _____

Did automatic failover occur?
    Yes __   No __

Did automatic failback work?
    Yes ___   No ____

Did application restart on surviving node?

    Yes ____   No _____

Was data integrity preserved during failover?

    Yes _____   No _____

Was application functional after hardware induced failures?

    Yes _____   No _____

Comments on functionality:

_____

_____
____

_____
____

c) Concurrency ==(information below provided by IBM Technical Consultants)==
Your application may have been tested to run concurrently with other applications. If so, each application should be actively running on the server simultaneously during the test.

List all applications running concurrently during the test:

Applications	**Program Names**
E-mail	_____
Database	_____
Network Management Tools	_____
Systems Management Tools	_____
File/Print Sharing	_____
Other Applications	_____
Utilities	
Power Management	

Concurrency Comments:

_____

_____
____

Comments:

_____

_____
____

_____
____

Appendix B Sample 2-node MSCS Hardware Setup and Configuration

The setup information below should be used in conjunction with the latest instructions provided for setup and configuration of a MSCS cluster. The latest instructions can be found on the web at: url: *http://www.pc.ibm.com/ww/eserver/xseries/clustering/*

Hardware

A.   Two Server Nodes and one PDC for authentication of users

B.   The Server Nodes will have the following hardware installed:
    1.   Two or Three ethernet network cards.
       i.   One Ethernet card will be used for the private heartbeat link between servers.
       ii.   The other Ethernet card(s) will be used for a public network to attach to clients.
    2.   One or more hardfiles to be used as the operating system drive. This drive will either be connected internally to one of the onboard adapters, Adaptec or ServeRaid , or it may be connected to a RAID controller in a PCI slot,.
    3.   For IBM Fibre Channel setups:
       i.   one fibre channel adapter in each server.
    4.   For ServeRAID Shared Disk setups:
       i.   One ServeRAID card with unattended mode on.
       ii.   ServeRAID card set at Optimal (set in GUI).

C.   Five or more external DASD arrays
    1.   The PCI device(s) to access the arrays cannot come before the boot drive adapter on the PCI bus.
    2.   At least one of the following will be included in each test setup:
       i.   EXP 10
       ii.   EXP 15
       iii.   FaST 200
    3.   Two to be used as the Quorum Disk which will be shared also
    4.   The other four+ to be used as shared drives

1 Disk Arrays

A.   On each DASD (one per channel), one array and one logical drive will be created using all available space.
B.   The Quorum disk will be RAID 1 and the other shared arrays will cover the remaining available RAID levels.
C.   The stripe size of the adapters is the same and cannot be changed for SCSI setup.
D.   **ServeRAID Only:**
    1.   All array operations will be performed from the ServeRaid GUI Configuration Utility.
    2.   The SCSI ID will be set on Node A to ID #6, and will be left at ID #7 on Node B.
    3.   Merge ID's will be created, one unique ID for each array.
E.   **Fibre Channel Only:**
    1.   All array operations will be performed from the Symplicity Storage Manager Utilities.

₂ **Software**

  A. **PDC Setup**
    1. NT 4.0 or Windows 2000 as a PDC
    2. Assign addresses to both public network cards
      i. 203.x.x.101
      ii. 203.xx.x.101
      iii. Subnet Mask: FF.FF.FF.0
    3. WINS Manager
      i. WINS address will be xxx.xx.x. 101 for the first NIC
      ii. xxx.xx.x.103 for second NIC
    4. Install latest NT or Windows 2000 supported Service Pack

  B. **Node A and B Setup Steps**
    1. NT 4.0 Enterprise Edition with Stand-Alone Server option
    2. All drives, shared and non-shared, will be installed during NT installation
    3. The latest drivers will be updated for the following adapters:
      i. Onboard SCSI
      ii. Fibre Channel adapter
      iii. ServeRAID adapter
      iv. Ethernet card
      v. Onboard ethernet
    4. Set all Ethernet card ethernet card speeds to 100Mbit
    5. Set public network ethernets to half-duplex mode
    6. Set the private heartbeat Ethernet card to full duplex
    7. Addresses for both public networks
      i. One public network will be on the Ethernet card, the other on the onboard ethernet, unless in a system with no onboard ethernet, in which case it will be on another Ethernet card
      ii. Example: Node A:
        a. Arbitration Link: 203.x.xx. 102
        b. Public Network 1: 203.x.xx.102
        c. Public Network 2: 203.x.x.102
        d. Mask: FF.FF.FF.0
      iii. Example: Node B:
        a. Arbitration Link: 203.x.xx.103
        b. Public Network 1: 203.x.x.103
        c. Public Network 2: 203.x.x.103
        d. Mask: FF.FF.FF.0
    8. Primary WINS address is the corresponding PDC WINS segment address for each NIC in the server.
      a. NIC on segment 1 will have WINS address 203.x.x.101
      b. NIC on segment 2 will have WINS address 203.x.x. 101
    9. Service Pack 4

C. **MSCS Cluster Setup Steps**
1. Install ServeRaid Administration utility on both nodes
2. Partition shared drives using NTFS with volume labels indicating drive letter in disk administrator
3. Create drive letters for all shared disk arrays manually on both servers, so they do not change, and which correspond to the volume labels created on them. Use the NT disk administrator.
4. ServeRAID Shared disk only:
   i. Run the IPSHAHTO.EXE with the /synchoff switch from a Node B command prompt to pull all shared drives and ensure a correct setup. Drives must show up on Node B in the same arrangement as they were in Node A.
   ii. Run IPSHAHTO.EXE with the /synchoff switch on Node A to pull the drives back.
5. Install MSCS version 2.23 with the /localquorum switch on Node A with Node B shut down, specifying the IP address for the virtual server and drive letter for the quorum ("where to store cluster files").
6. Install MSCS on Node B, joining the cluster created on Node A.
7. ServerRAID Shared Disk Only:
   i. Run NT Cluster Solution on both nodes and reboot.
8. Install Cluster Administrator on PDC for monitoring and administration purposes.
9. Reinstall the Service Pack on both nodes and PDC.
10. Create alternating IP address resources for each physical disk group. Alternating meaning alternating segments, ie network 1 and network 2.
11. Create a network names for each disk group with a dependency on the IP address.
12. Create a file share for each disk group with a dependency on the Network Name resource and the Disk resource.
13. Enable failback on all disk groups and set the threshold to 1000 or so.
14. Set alternating preferred owners of Disk Groups, so that approximately half are on Node B and half are on Node A. Set the Cluster Disk group as having a different preferred owner than the disk group with the Quorum.
15. Before testing, move all groups to their preferred owners.

A. **Client Setup Steps**
1. **N**T Workstation 4.0 or Windows 2000 Professional edition
2. Latest level of service pack
3. Specify the PDC as the Primary WINS server.
4. Network Exerciser
5. Put 4 clients on each segment
6. Map Client local drives to their respective file shares on the shared storage drives: Two clients for every disk group