

IT Operation of Large UNIX Systems

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Andy McMenemy
IT Strategy & Architectures
IBM (UK) Ltd.

Preface

This document provides the outline of areas to be assessed when reviewing the operational practices of large UNIX sites.

Document History

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1 Introduction

The assessment of the operational performance of an organisation is based on the analysis of their practices. This document provides a framework for that analysis.

1.1 Completing the Survey

All the questions in the survey are evaluated on a 1-to-5 rating. You should complete each question by entering your “score”. Some samples are provided to help you determine where you fit. If you don’t see an exact match, then use an intermediate value to indicate that you are better than one of the descriptions, but not as good as the next.

2 Organisation

Business name _____
Site name _____
Address _____

Country _____

Survey date _____
Name of IBM Contact _____
e-mail of IBM contact _____

2.1 Industry Segment

- | | |
|---|---|
| <input type="checkbox"/> Banking, Finance, Securities | <input type="checkbox"/> Manufacturing |
| <input type="checkbox"/> Distribution | <input type="checkbox"/> Petroleum |
| <input type="checkbox"/> Education | <input type="checkbox"/> Process Control |
| <input type="checkbox"/> Government | <input type="checkbox"/> Telecommunications and media |
| <input type="checkbox"/> Health care | <input type="checkbox"/> Travel and transportation |
| <input type="checkbox"/> Insurance | <input type="checkbox"/> Utility and energy services |
| <input type="checkbox"/> IT Services | <input type="checkbox"/> Other: _____ |

2.2 Number of Employees in IT Service Delivery

- < 10 10-20 21-40 >40

2.3 Number of Servers

- < 5 5-15 16-30 >30

2.4 Number of Vendors

- 1 2 3 >3

2.5 Scope of Operation

- | | |
|--|---|
| <input type="checkbox"/> Deliver all company IT services | <input type="checkbox"/> Deliver only internal services |
| <input type="checkbox"/> Deliver subset of company IT services | <input type="checkbox"/> Deliver services to external users |

3 Service Levels

	1	3	5	Score
Objective	Hope to keep the services running as long as possible.	Meet target availability defined for critical applications.	Meet service level commitments with each distinct user community for each supported business application.	
Monitoring	IPLs and application down time is not measured	Major system failures are recorded.	All incidents which result in loss of any agreed service are recorded and investigated	
Reporting	Service level reports are not published	Incident reports are made available to IT management	Service reports are published to users charting achieved service levels against agreed levels.	
Achievement	Get by	Usually meet target availability	Consistently meet agreed service levels	
Performance	Little change in the system	Service is improving	Service consistently exceeds all agreed metrics.	
Satisfaction survey	No satisfaction survey has been performed	Satisfaction surveys are done on a regular basis and some actions taken	Satisfaction surveys are performed on a regular basis. Action plans are communicated back. Follow up ensures all actions are completed.	
User satisfaction survey	Some complaints are forthcoming and may need escalation to resolve.	Few complaints are received but are handled as a priority. User satisfaction is tracked.	Users are generally delighted and their expectations are normally exceeded.	

4 Availability

	1	3	5	Score
Application analysis	Try to keep the systems running as well as possible	Importance of each major application is understood.	Importance of each application is clearly understood and documented.	
Do you know the financial cost of, say, ½ day's loss of service	No	Have estimated cost of service loss for main application	We have calculated the costs of any service loss.	
Platform analysis	Don't overanalyse the platform.	Know where the major application runs and how critical that server is.	Importance of each server is understood.	
Hardware design	System was configured to meet development budget. Service delivery were not involved.	System was configured with some redundancy. Mirrored or RAID disk is available.	System was configured with failover in mind. Mirrored or RAID disks are twin tailed to a separate system which can assume the workload if necessary.	
Monitoring of System Failures	Soon find out if something is wrong because the users complain	Operators keep a watchful eye on the system console for the major application	Automated software monitors system and application status.	
Reaction to failure	Operator restarts failed system	Operator follows recovery procedure to retrieve the service	Automated software detects failure and takes recovery action. Operator is alerted.	
Monitoring of threshold conditions	Administrator occasionally checks file systems and database status.	Administrator runs a standard procedure on a fixed schedule to check on file system and database status.	Automated procedure monitors file system thresholds and database. Alerts are raised when action is required.	
Database logs	Database logs are kept wherever there is adequate space	Database logs are on mirrored or RAID disk	Database logs on mirrored or RAID disk and are kept separate from the database.	
Test environment	Use spare capacity on live system	Use capacity of live system when application is quiesced over night	Have a separate test environment.	

4.1 Problem Management

	1	3	5	Score
How are problems raised	Not really sure	Someone phones the operator or administrator	Incident is raised with help desk or by operations and problem is recorded.	
Ownership - who owns a problem	Whoever had the problem	The operator or administrator	Ownership of the problem is retained by the help desk.	
Categories of problem	Don't worry about that, problems are problems.	We define several categories or problem and ask for help if it is needed.	We define several categories of problem and have target response times for each, and clear escalation procedures.	
Escalation	Managers shout a lot	We phone the system administrator who contacts the supplier if necessary	We have clearly defined escalation paths and full maintenance and support agreements with our suppliers.	
Response	Problems are solved	Problems are solved as soon as possible	Problems are prioritised and solved within the target times allowed.	
Reporting - are problem reports kept	Possibly	Probably	Full documentation of each problem, its diagnosis, and eventual resolution is retained.	

4.2 Disaster Recovery

	1	3	5	Score
What is your attitude to disaster recovery	Cross that bridge when it happens	Have documented a plan	Have a documented and tested DR procedure	
What would be the impact to your business if your site was destroyed by fire or some other disaster.	Don't know	We'd have a short period in which to recover, otherwise the business impact would be catastrophic.	Our tested DR plan shows that we could be providing a contingency service quickly enough to minimise any impact	
What are your future plans for disaster recovery	Don't know	Will develop full plan and test.	Will continue to refine and test the existing plan.	

5 Security

	1	3	5	Score
Are your servers physically secure	Possibly	They are in a locked room	They are in a permanently monitored, access controlled location.	
Are removable parts secure	No one would take the parts out of the machines while they are running	Machines are key locked	Machines are key locked and physically secured. Keys are stored in manager's safe.	
Machine room access	Non-operations personnel can enter the machine room at the discretion of the operator	Certain authorised personnel can enter the machine room.	Access and egress from the machine room is monitored. Non-operations personnel must be accompanied at all times and must sign-in and sign-out	
Are passwords required for all accounts on the system	Possibly	Probably	Absolutely	
Are there rules to enforce the selection of nontrivial passwords	No	Possible	Yes	
Are you forced to change passwords on a regular basis.	No	Only privileged accounts	All passwords are subject to an expiry period.	
Does anyone use the <i>root</i> account as their general account	Yes, the operator or administrator	Wouldn't think so	No, you cannot log in as <i>root</i>	
How widely is the <i>root</i> password known	Not sure	Administrator and operators	Administrator	
Are accounts automatically logged off if idle	No	Only user accounts	User accounts and privileged accounts are logged out if idle	
Are operator passwords required	No	Yes there is a single operator id	Yes, each operator has own id and password	
Are operator passwords changed when operator leaves the company	No	Yes	All operator accounts are forced to change passwords, and that operator's account is disabled	
Can user terminals be activated outside normal service hours without prior arrangement	Yes	Only in access controlled areas	No, all access devices are disabled outside normal service hours unless prior arrangement have been made	

6 Change Management

	1	3	5	Score
Do you have a change management procedure	No we make changes as required	Yes changes must be tested before going live	Yes, changes must be authorised and must be accompanied by relevant documentation	
Do you have a change tracking system or log	No	Yes there is a hard copy log by the operator console	Yes there is an integrated change management system	
Can changes be made to the system without completing the change log	Probably	Don't think so	No	
Do you have an up to date hardware inventory.	No	Yes	Yes, hardware is also covered by the change control procedure and changes require updates to the hardware inventory	
Do you have an up to date hardware diagram	No	Just about	Yes, hardware is also covered by the change control procedure and changes require updates to the hardware inventory	
Do you have an up to date network diagram	No	Just about	Yes, hardware is also covered by the change control procedure and changes require updates to the hardware inventory	
Do you have an up to date software inventory for each server	No	Yes	Yes, operating software is covered by the change procedures and inventory must be modified when change is signed off	
Do you have a procedure to ensure that the hardware and software inventories and the system diagrams are kept up to date	No	Not a formal procedure, we do it on a best efforts basis	Yes, it is an integral part of our change management process	
Can a service engineer make changes to the system without making an entry in the log	Yes	Not sure	NO, we have a written commitment from our service organisations that no changes will be made to the system without an entry in the system change log.	

7 Operations

	1	3	5	Score
Do your operators have written operations procedures	No	Some	There are fully maintained operations procedures available in hard copy and on-line	
Do your operators have root privilege	Yes	The shift leaders may have the password	No	

7.1 Backup

	1	3	5	Score
Are your servers backed up	No, they have never had a problem	Yes, occasionally	Yes, we have an automated backup schedule	
Have you tested your recovery procedure	No	We've recovered the odd file as needed	Yes, we tested a full recovery of the backed up systems	
Are you databases backed up	Possibly	Probably	We have a automatic schedule which ensures the databases and their logs are backed up.	
Do you know how it takes to restore your databases	No	About the same time as they took to back up	Yes, we have tested the restore and have an accurate idea of restore times.	
Is there a single backup management procedure to cover all the servers	No, each has its own	Yes, we apply the same rules to each	Yes we have a single backup server with automated tape control which provides the backup for all the systems.	

7.2 Help Desk

	1	3	5	Score
Do you have a help desk	No	Operators or system administrators take calls and queries	Yes we have a separately manned help desk.	
Are all calls put through to the help desk	No	Some people phone ops direct	Calls are all routed to the help desk.	
Are statistics kept and reported	No	Only call volumes	Yes, we analyse the calls for patterns, incipient problems, and evidence of training requirements	

8 Service Management

	1	3	5	Score
How do you determine your service requirements	Work out how long the backup takes, add a bit, and say the service is available for the rest of the time.	Service requirement is specified by the application development department.	Operations are represented when application requirements are gathered from the user departments. These requirements fed into our resource plan.	
To what degree are operations involved in the IT strategy	Not at all	Ops manager attends vendor briefings during procurement process.	Operations analysts are fully involved with and influence the Technical Architecture team in the development and execution of the IT strategy.	
How do you find out what new applications or services are required.	Development ask for system test time and tell operations when the system will go live.	Operations are asked to run system tests and develop operating procedures for the new system.	Operations are represented throughout the development process, and can influence it at every stage. This liaison means they are aware of project time scales, and understand their responsibility for system test and development of operating procedures	
Resource planning	Install systems when told.	Monitor the performance of systems to ensure adequate performance to meet service levels and changing requirements.	Monitor performance levels and service requirements. New systems and upgrades are planned against this schedule	

8.1 Human Resources

	1	3	5	Score
Attitude to training and courses.	Can't beat "on the job" training	Send new staff on training courses to get them started.	Skills requirements are continually reviewed and education made available to meet the changing environment	
How do you rate employee morale	Generally under pressure. Anxious about the future. Cynical.	Stable work force. General progress, occasional pressure.	Stable work force with clear opportunities for advancement. Optimistic and confident.	

A Additional Reading

There are a number of excellent books which address the various issues and disciplines of running large scale UNIX servers. My particular favourite is:

Essential System Administration, by Aeleen Frisch; ISBN 0-937175-80-3
Published by O'Reilly & Associates, Inc.

I have also written a white paper entitled "*RS/6000 SP: Best Practices*" which looks at the issues of running a large scale UNIX server such as the RS/6000 SP.