

Code of practice for

Performance monitoring of computer-based systems

UDC 681.3.02.001.42:651.012.14

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This British Standard, having been prepared under the direction of the Office and Information Standards Committee, was published under the authority of the Board of BSI and comes into effect on 31 March 1982

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The following BSI references relate to the work on this standard:
Committee reference OIS/15
Draft for comment 81/60468 DC

ISBN 0 580 12658 7

Amendments issued since publication

Amd. No.	Date of issue	Comments

Contents

	Page
Cooperating organizations	Inside front cover
Foreword	ii
Section 1. General	
1 Scope	1
2 References	1
3 Definitions	1
Section 2. Key aspects of the system being monitored	
4 General	1
5 Applications software	1
6 Operating and support software	2
7 Hardware configuration	3
8 Hardware ageing	3
9 System inputs	4
10 System usage	5
11 Effects of other systems	6
Section 3. Monitoring techniques	
12 General	7
13 Use of routine records	7
14 Hardware monitors	8
15 Software monitors	8
16 In service testing	9
17 System audit	10
18 User surveys	10
Section 4. Performance monitoring reporting	
19 General	11
20 Performance criteria	11
21 Evaluation of performance measurement data	11
22 Performance reporting	12
Publications referred to	Inside back cover

Foreword

This code of practice is concerned with monitoring the performance of a computer-based system in service. It is complementary to BS 5887 and is relevant to the same range of systems and environments.

BS 5887 recommends that “systems that are particularly important to the user and have one or more critical qualities should be monitored while in use” in order to ensure that adequate standards of performance are maintained. In this context it is necessary to:

- a) appreciate what influences may affect the performance of a system in service;
- b) be aware of the range of monitoring techniques which may be employed to detect the effect of these influences.

This code provides a basis upon which organizations can develop performance monitoring procedures appropriate to their needs. The extent to which these recommendations are applied will vary according to the relative complexity of each system and its importance to the organization.

It is important to recognize that the impact of changes on the performance of the system can differ according to whether these changes are:

- a) identified in sufficient time for their effects to be evaluated;
- b) unpredicted and gradual so that there is a risk of their effects going unnoticed until they reach a critical point;
- c) unpredicted and sudden with an immediate effect on system performance.

It follows from this that every effort should be made to impose adequate controls on change in order that serious effects upon levels of performance can be anticipated and appropriate action taken.

Each organization should examine each of its systems to establish what aspects are particularly critical to their requirements. Section 2 of this code is intended to assist organizations to conduct this examination by identifying elements of change to those aspects that can affect the performance of a system.

There are some changes that may affect more than one of the key aspects in section 2. These have been repeated in the text of the code, where necessary, for the sake of clarity.

Having established which elements are considered to be important, the organization should then establish which monitoring techniques will provide the information necessary to determine the degree to which these elements may affect the performance of the system. Section 3 is intended to assist organizations to identify the techniques which can be applied most effectively to their particular hardware and software configurations. The most cost-justifiable of these effective techniques can then be applied.

It is essential to assess each system correctly so that the monitoring procedures that are developed are adequate without exceeding the bounds of cost-justified necessity.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 12, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General

1 Scope

This code of practice applies to all computer-based systems. It comprises four sections.

Section 1 comprises preliminary clauses.

Section 2 gives guidance in carrying out a detailed examination of the system that is to be monitored. It identifies key aspects of the system, its usage and other systems that share the same operating environment. Guidelines and check lists are provided for each of these aspects to assist the user in identifying elements of change that can affect performance.

Section 3 identifies a variety of monitoring techniques that may be used to measure these changes in performance.

Section 4 gives guidance on the documentation of performance monitoring information.

This code gives guidance to enable organizations to:

- a) assure the continuing quality of a computer-based system in service;
- b) develop and apply appropriate monitoring techniques;
- c) obtain early diagnosis of changes in the behaviour of the system;
- d) detect faults so that action can be taken to avoid fault propagation.

This code assumes that the system:

- a) was adequately tested in accordance with BS 5887 and documented in accordance with BS 5515;
- b) performed as required under normal operating conditions;
- c) was initially schedulable within the constraints imposed by other systems and manufacturer's design.

This code also assumes that, in service:

- a) the system runs under effective configuration management;
- b) documentation is maintained.

2 References

The titles of the publications referred to in this standard are listed on the inside back cover.

3 Definitions

For the purposes of this British Standard the definitions given in BS 3527 apply.

Section 2. Key aspects of the system being monitored

4 General

This section gives guidance that is designed to assist the user to make a detailed examination of the system being monitored for all the likely causes of a change in performance. It also indicates ways in which changes to other systems sharing the same resources may affect the performance of the system being monitored.

5 Applications software

5.1 General. Some elements of change may have been anticipated during the design of the system but serious effects can arise from changes that occur, but which were not visualized in the original specification.

5.2 Elements of change. Among the elements of change that should be examined, the user should note that:

- a) standards of accuracy can affect processing times;
- b) security controls can extend input and output duration;
- c) validation checks can extend input and output duration;
- d) changes in coding of data can affect input and output times and storage capacity required;
- e) changes in code structures can affect input and output times and storage capacity required;
- f) changes in the structure of the data base and files can affect input and output times and storage capacity required;
- g) changes in input method/documents can increase input times;
- h) changes in output method/documents can increase output times;
- i) changes in parameter values can change processing times;
- j) changes to algorithms or formulae could change processing times;
- k) some changes may not be reflected in the procedures;
- l) some changes may not be reflected in the documentation.

6 Operating and support software

6.1 Introduction. Changes to the operating and support software and system can have a considerable influence on the efficiency and behaviour of a system. Such changes are quite usual for various reasons (e.g. correction of faults or the improvement of facilities) but a careful examination of their implications should be made to ensure that no harmful side effects will occur.

6.2 Elements of change

6.2.1 Operating software. Operating software includes all the system facilities used in the course of running application programs. The main consideration is that an alteration to a system facility may affect some or all application programs, or modules, and it may not be practicable or desirable to cross-reference facilities with applications. Hence changes cannot necessarily be guaranteed to have no side effects and each one should be treated on its merits.

The main system facilities that come under this consideration are:

- a) system library, holding commonly used modules;
- b) file handling system (changes here almost certainly affect all application programs);
- c) job control language (new or added commands or formats);
- d) input/output;
- e) scheduling. (Changes to the priority strategy will affect run-times, elapsed times or even what time of day or night an application will be run. These in turn will affect the run-time costs.)

6.2.2 Support software

6.2.2.1 General. This software includes all the system facilities used in the course of program preparation. The undesirable result of changes in this area is the necessity for programmer retraining and the possible reduction in software quality and throughput until the changes are fully understood.

6.2.2.2 Language translators (compilers). Special consideration should be given to this facility. Changes in this area may have a very significant effect on application systems performance and should be carefully vetted as they may not always be apparent. Generally, changes will be manifested as version updates or the same language from a different supplier (probably giving faster run-time code, or better store utilization, or just improved facilities). Even if a system has been extensively acceptance tested, there remains a need to understand that it is inherently impossible to obtain 100 % assurance that errors have been eliminated or all implications fully appreciated. Some of the more obvious features that may cause difficulty on an otherwise identical translator are syntax, semantics, reserved words and keywords, translator directives and linking.

Some of the less obvious features that should be considered are as follows.

a) *Arithmetic.* Although these problems should be resolved during acceptance testing of the new translator, explicit checks should be made on the following points to ensure conformity with previous software:

- 1) truncation and rounding;
- 2) the result and remainder from the division algorithm;
- 3) equality tests for floating or mixed arithmetic;
- 4) overflow limits should not be less than previous limits.

b) *Expressions.* This feature is a similar problem to a) and the following points should be checked:

- 1) order of evaluation should be identical;
- 2) mixed "type" conversion should give identical results;
- 3) intermediate state limits should not be less than previous limits.

c) *Procedures and functions.* The following points should be checked:

- 1) order of parameter evaluation should be the same;
- 2) the parameter mechanism should behave in the same way for the same cases (by reference, value etc.). This behaviour is particularly important for default cases.

d) *Optimization.* A different optimization method can give different results for some application programs.

e) *Error handling.* Changes can cause some temporary misinterpretation.