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**Information technology - Software measurement - Software
quality measurement - Automated source code quality
measures**

信息技术 软件测量 软件质量测量 自动化的源代码质量测度

(English Translation)

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting.

This document is modified to adopt ISO/IEC 5055:2021 "Information technology software measurement - automated source code quality management of software quality" Measurement.

Compared with ISO/IEC 5055:2021, this document has many structural adjustments.

See Appendix A for a list.

This document has many technical differences compared to "ISO/IEC 5055:2021".

A single vertical line (|) indicates these differences. A list of these technical differences and their reasons is given in Appendix B.

The following editorial changes were made to this document.

--- As 6.1 of ISO/IEC 5055:2021 provides an overview of Chapter 6, the title of this document is changed from "Purpose" to "Overview";

--- This document changes the incorrectly cited chapter number in 6.1 of ISO/IEC 5055:2021 when summarizing the contents of other chapters. 6.2, 6.3 and 6.6 were revised to 6.3, 6.4 and 6.7 respectively;

--- ISO/IEC 5055:2021, 6.2. "These violations constitute each quality metric in the automated source code information security measurement Elements" is only for information security, this document is changed to "These violations constitute each quality measure in the automated source code quality measurement "Degree elements", covering all quality characteristics;

---ISO/IEC 5055:2021 has clarified that SPMS is the structured pattern metamodel standard. This document changes the title of 5.10 from "Software Pattern Metamodel Standard (SPMS)" was changed to "Structural Pattern Metamodel Standard";

---6.10 of ISO/IEC 5055:2021 incorrectly counts 6 mode sections as 7. This document deletes the "reference link" mode Section, so this document retains 5 mode sections;

---Since there are multiple numbers for the same test mode in ISO/IEC 5055:2021, this document is changed to the formula corresponds to only one number.

Introduction

With the widespread application of computers in various fields, the quality of software products has received more and more attention.

It is directly related to the accuracy of the business and may also have a direct impact on personal safety. Therefore, it is important to select and develop trustworthy and reliable software.

In order to quantitatively evaluate the quality of software products, it is necessary to clearly define the quality measurement of software products.

Therefore, standardizing the quality measurement of software products is extremely important for software quality assessment.

In recent years, the domestic software development life cycle has gradually been standardized, and users have gradually extended their attention from software products to the quality of source code.

Although GB/T 25000.23-2019 defines software measures for quality characteristics in

GB/T 25000.10-2016, these the metrics are mainly focused on the software behavior level, only a small number of metrics are provided at the source code level, and the metrics used during development are not fully defined.

Therefore, suppliers in different contracts may have different interpretations and calculations of common source code quality measures.

This document supplements GB/T 25000.23-2019 by defining software quality measures at the source code defect level and adds the source code level measurement is strengthened to support the GB/T 25000 software product quality standard. The relationship between this document and the GB/T 25000 standard is shown in Appendix C.

This document aims to quantitatively evaluate the structural quality characteristics of software source code. These quality characteristics include maintainability, performance efficiency, to this end, this document defines four automated source code quality measures (ASCQMs), namely, automated source code quality, Automated Source Code Maintainability Measure (ASCMM), Automated Source Code Performance Efficiency Measure (ASCPem), Automated Source Code Reliability Measure (ASCRM) and Automated Source Code Security Measurement (ASCSM). These automated source code quality measurements are defined in accordance with Definition of quality characteristics that need to be quantified in GB/T 25000.10-2016. Each measurement is based on the source code that affects the measured quality characteristics.

The number of defects is calculated based on the number of defects, that is, the number of defects in the source code that violate good architecture and coding practices and may cause unacceptable operational risks or be too high.

The cost behavior is detected and counted.

The automated source code quality measures in this document do not detect all possible defects in the above four quality characteristics, but focus on Detection and statistics of serious defects. This document lists 194 serious defects in detail, including 29 maintenance defects, 18 performance and efficiency defects, However, since some defects belong to multiple quality characteristics at the same time, the actual this document contains only 137 separate defects.

Although the research and development of automatic tools for static quality analysis of source code in China has achieved certain results, compared with foreign countries, the domestic source code is still There are still some problems in the areas of false positives and false negatives in automated code static quality analysis tools, which need to be further improved.

The analysis of structural quality defects has identified a series of common code structure patterns, which are mainly based on whether the code meets the requirements of each defect can be found by one or more detection modes.

The inspection mode may also be applicable to the inspection of multiple defects. This document contains 135 inspection modes, which can be used for domestic Provide guidance for the development of automated tools for source code static quality analysis.

The main body of this document uses the Structured Pattern Metamodel Standard (SPMS) to represent each defect and detection pattern, and uses knowledge generation the KDM represents the code elements for these detection patterns.

This document provides two formulas for calculating the defect and quality characteristic scores for each quality measure.

When comparing the automated source code quality measurement results of different software, due to the software scale and the different focus of users on defects, the same quality measurement Different evaluation results may be produced.

With the development of software engineering technology, traditional functions traditionally implemented in IT applications are now being transferred to embedded software/systems in this paper, the measurement of source code quality is becoming more and more popular and important for embedded systems, the Internet of Things, etc.

The defects contained in this document apply to all forms of software, so this document does not describe defects in embedded software alone.

This document may be updated due to the addition of new serious defects or the continuous development of computer technology.

As the technology improves, the data on defects and detection patterns will increase accordingly. Therefore, this document will be a standard that adapts to changes in computing technology.

Information technology Software measurement Software quality measurement Automated source code quality measurement

1 Scope

This document specifies the quantification of structural quality characteristics (maintainability, performance efficiency, reliability and information security) of software source code.

Automated source code quality metrics for evaluation.

This document applies to source code quality measurement performed by software purchasers, suppliers, and third-party organizations using automated tools.