



SOFTWARE RESEARCH, INC.

# METRIC

SOFTWARE METRICS PROCESSOR / GENERATOR

The image displays four windows from the METRIC software. The top-left window shows a 'Complexity Report by Procedure' for a source file, listing various metrics for each procedure. The bottom-left window shows a 'Summary Complexity Report for: src.c', providing aggregate statistics. The bottom-center window shows an 'Exception Report for Procedures in /home/steiner/tool/metric/src.c', listing procedures that exceed predefined threshold limits. The right window shows a Kiviat chart, a circular radar chart where each axis represents a different metric, and the distance from the center indicates the value for that metric.

**METRIC** generates software measurements for a program with the reports and graphs: a Full report (top left) displays measurements for each module; a Summary report lists measurements for the entire source code file, an Exception report (bottom center) indicates where code exceeds predefined threshold limits, and Kiviat charts simplify the measurement data.

## PRODUCT DESCRIPTION

In making decisions on how to allocate resources, or if there have been improvements in projects based on changes in process, you need some form of measurement. Software metrics provide a set of measurements to aid in these decisions.

STW/Advisor™'s METRIC™ tool makes the best of limited time by computing software metrics for source code to quantitatively determine the code's quality. This information identifies overly complex modules requiring extra testing or rewriting or determines the number of man-hours necessary to develop a related or similar software package.

The most common measure of software complexity has been the computing of the number of lines of code. Although this measure provides an adequate estimate of program size, it does not necessarily predict program complexity. True software

complexity measurements assign quantitative values to programs based on the structure of the code. These measures characterize various aspects of the code, which may be difficult to comprehend, modify or test.

METRIC offers a variety of software measurements. After METRIC processes a source code file, it automatically computes several metrics for the program. These metrics include the Halstead Software Science metrics which measure data complexity in routines, the Cyclomatic Complexity metrics which measure logic complexity in routines, and size metrics, such as number of lines, comments and executable statements. Metrics are reported in both configurable, easy-to-read reports and charts:

- The **Full** report provides a set of metrics for each of the modules in a given source file.
- The **Summary** report provides metrics for the program as a whole.

- The **Exception** report lists where the code exceeds user-defined metric thresholds. It advises whether each procedure and function falls within acceptable levels for your organization.

- The **Kiviat** charts display metric results from the Summary report, each metric is represented by an axis, and results are plotted with reference to user-definable upper and lower bounds. Because Kiviat charts indicate whether source code falls above or below set metric values, they serve as an invaluable means of quickly viewing the metrics to focus on for a particular program.

These reports and charts do not require an in-depth knowledge of metrics and computation.

Because METRIC identifies the most complex program modules, testing resources can be concentrated on just those identified complex parts.



**SOFTWARE SCIENCE METRICS**

- *n1* — Determines the number of unique operators in a program (e.g. keywords).
- *n2* — Determines the number of unique operands in a program (e.g. data objects).
- *N1* — Determines the total number of operators.
- *N2* — Determines the total number of operands.
- *Hybrid Metrics* — The above metrics derive hybrid metrics that compute program length, predicted length, purity ratio, volume, and effort.

**CYCLOMATIC COMPLEXITY METRICS**

- *Cyclomatic Complexity* — Determines the control-flow complexity of a program, based on the decision-making predicates.
- *Extended Cyclomatic Complexity* — Determines the control-flow complexity of a program, based on the decision-making predicates.

**SIZE METRICS**

- Number of Lines of Code
- Number of Blank Lines
- Number of Comment Lines
- Number of Executable Statements

**FULL REPORT**

- *Metrics* — Quantitatively measures source code quality by computing 17 Software Science, Cyclomatic Complexity and size metrics for each module.
- *Re-ordering Procedures* — Orders modules according to any metric, allowing the user to better identify those potentially error-prone program parts.
- *Width Configuration* — Sets the report's column width.

**SUMMARY REPORT**

- *Metrics* — Reports the same metrics as the Full report, except for the entire program rather than individual modules.
- *Error Prediction* — Estimates the number of coding errors that can be expected in a program, if the number of unique operators and operands used in the program are known.
- *Time Prediction* — Estimates how long a program should have taken to write.

**EXCEPTION REPORT**

- *Metric Maximum Thresholds* — Lists each procedure in a processed source code file which exceeds a set of predefined metric bounds.
- *Threshold Configuration* — Establishes the upper bounds of the metrics.

**KIVIAT CHARTS**

- *Metrics* — Derives measurement values from the Summary report into 3 Kiviat charts.
- *Minimum and Maximum Thresholds* — Uses upper and lower bounds to plot each metric against, permitting the user to establish their own standards.
- *Graphical Results* — Provides a quick overview of metric results.
- *Print Option* — Prints Kiviat charts to Postscript output.

**MULTIPLE LANGUAGE SUPPORT**

- C
- C++
- Ada
- FORTRAN

**SUPPORTED PLATFORMS**

- Sun SPARC
- x86 Solaris
- SCO
- SGI
- IBM RS/6000
- HP 9000 - 700/800
- DEC Alpha
- 386/486 UNIX

**TECHNICAL SUPPORT**

- Telephone hot-line assistance for installation and technical questions is available.
- Maintenance contracts provide continuing product support and upgrades.



For more details on METRIC, contact:

**SOFTWARE RESEARCH, INC.**

1663 MISSION STREET, SUITE 400  
 SAN FRANCISCO, CA 94103 USA  
 PHONE: (415) 861-2800  
 TOLL FREE: (800) 942-SOFT  
 FAX: (415) 861-9801  
 E-MAIL: info@soft.com  
 http://www.soft.com



STW/Advisor, METRIC and the SR logo are trademarks of Software Research, Inc. All other systems are either trademarks or registered trademarks of their respective companies.

Software Research, Inc. reserves the right to make changes without notice, and within its own discretion, to any of the information contained herein.