





The partner to quality software

Suresoft Technologies Inc.



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Introduction

Improved SW Quality

Test Automation

- Code Analysis
- Unit Test
- Code Coverage Measurement
- Message-based Test

Experts

- 40 Certified Specialists
 - Ph.D., M.S. Degrees
 - Licenses
- Research Center for Testing Technology

Field Experience

- Automobile
- Defense, Government
- Finance, Telecom
- Nuclear plant, Railway

Would you make **SURE Software**?

※ Safe/Usable/Reliable/Errorless

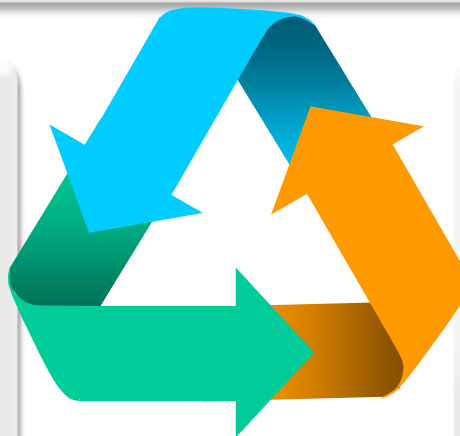
Feedback among business models

CodeScroll™

- Automated SW Testing Tools
- Package/License Biz. Model
- Co-work with Testing Service Companies

Testing Solution

- Based on Automation Tech.
- Specialized Solution for Each Business Domain
- Customizing Service



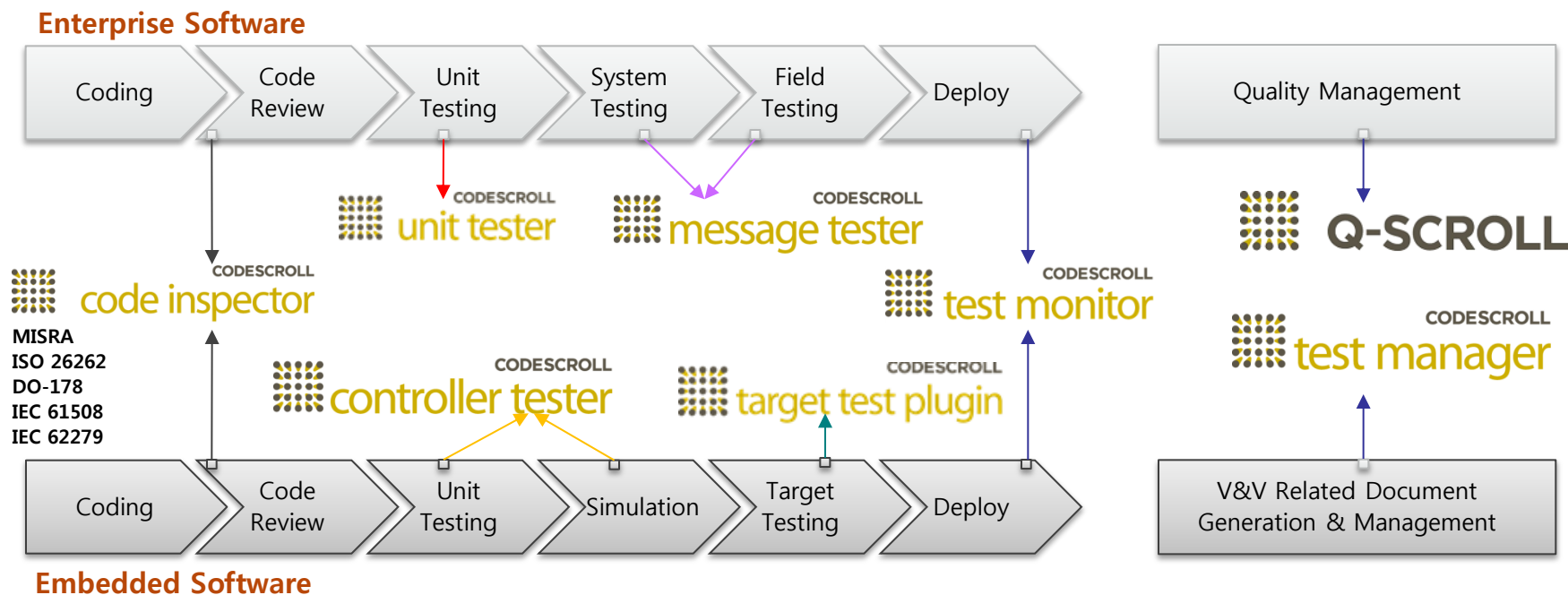
V&V Service

- Based on International Standard
- V&V for Mission Critical SW

-
- # Packages

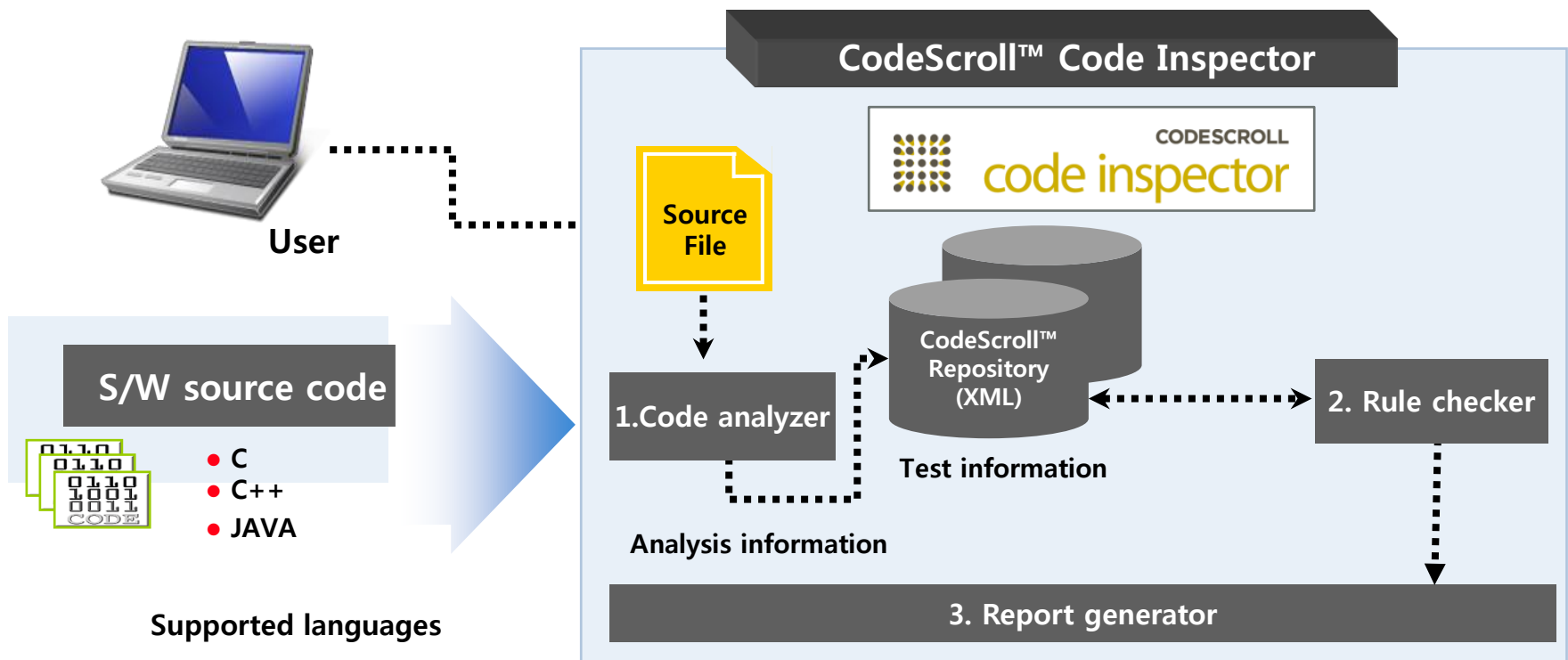
- ◆ Lineup
- ◆ Code Inspector
- ◆ Controller Tester
- ◆ Test Monitor

- World's Leading Automated Software Testing Tools



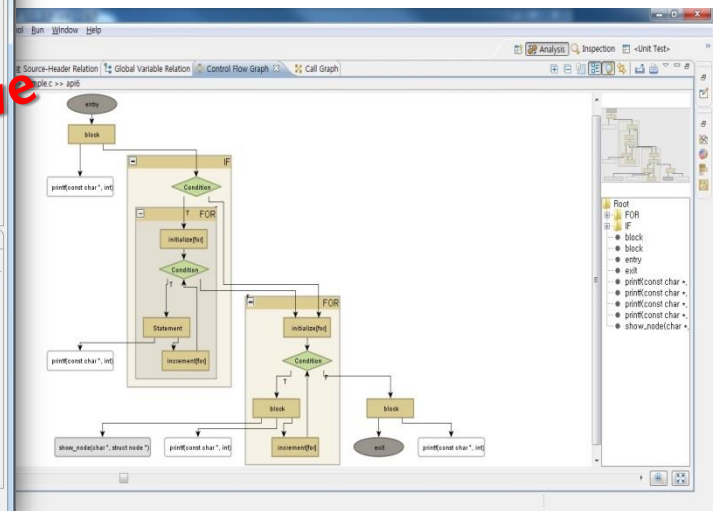
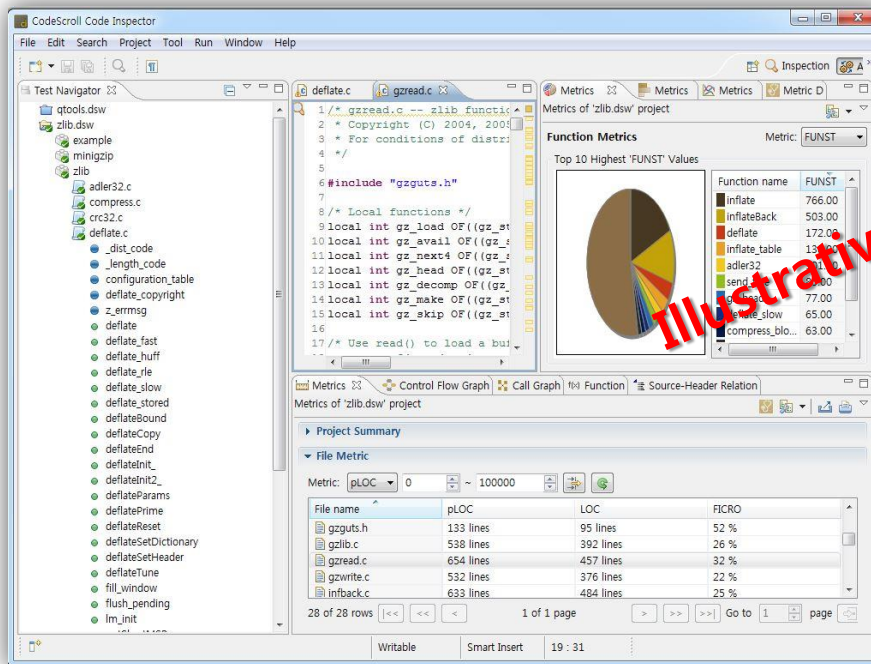
CodeScroll™ Code Inspector

- Provides analysis information by analyzing source code(complexity, cohesion, control flow graph and etc.)
- Checks violence of coding rules
- Provides test result(HTML, EXCEL)
- Supports international standards(IEC61508, IEC62279, ISO 26262, MISRA C/C++)



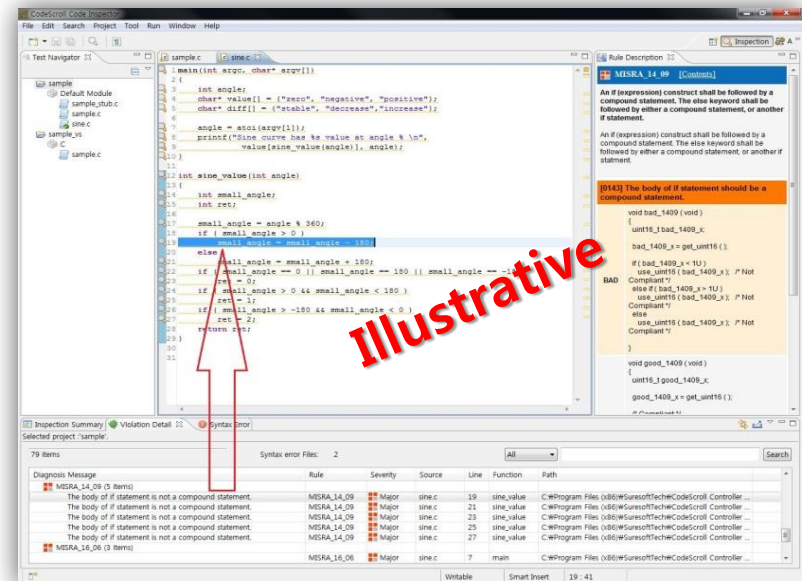
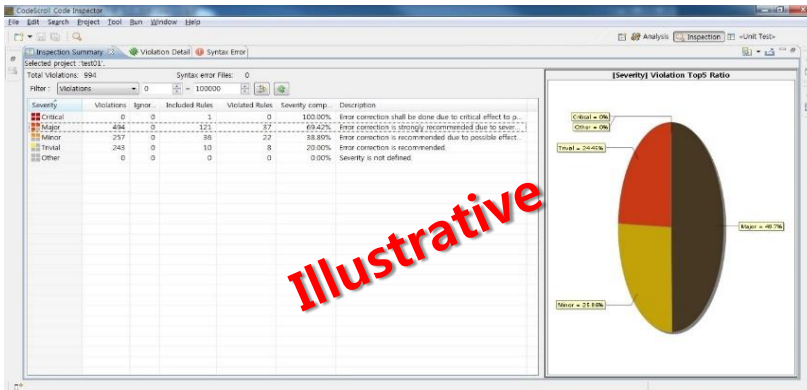
Code Inspector's Key Features #1

- Provides Analysis Result of Source Code
 - Provide Various Metric, such as size, LOC, comment ratio, complexity, cohesion, etc
 - Provide control flow graph, function call relation.
 - Source-header relationship for building binary code



Code Inspector's Key Features #2

- Checks violence of coding rules
 - Provide rule violence by various categories (severity, source)
 - Provide exact violated location (Debugging information for developer)



Code Inspector's Key Features #3

- Generate Inspection Results
 - Provide various formatted reports(HTML, MS-Excel)

Code Inspection Report

Sample (Inspection)

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< Analysis Information >

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1. Total Summary
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3. Violations by RuleSet
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5. Violations by ISO 9126 Quality Attributes
6. Violations by Top Most File
7. Violations by Top Most Rule
8. File Rule Compliance
9. File Rule Defect Density
10. File with No Violation
11. Rule with No Violation
12. Compile Failed File

1. Total Summary

Program Information	Language	C/CPP
	Common Path	E:\Program Files\SureSoftTech\CodeScroll Inspector for Administrator 2.3\sample\c\
	Total Files	2 (Input File 1 / Included File 1)
	Total Lines	528 lines
	Total Comment Lines(Ratio)	13 lines(2.46%)
	Total Functions	17
Settings	RuleSet	MISRA 2004, SureSoft
	Project Path	E:\Program Files\SureSoftTech\CodeScroll Inspector for Administrator 2.3\working_directory\Sample
Result Summary	Total Violations	360
	Violated Files / Total Files	2 / 2
	Violated Rules / Total Rules	65 / 201
	Total Rule Compliance	67.66%

Severity Violations

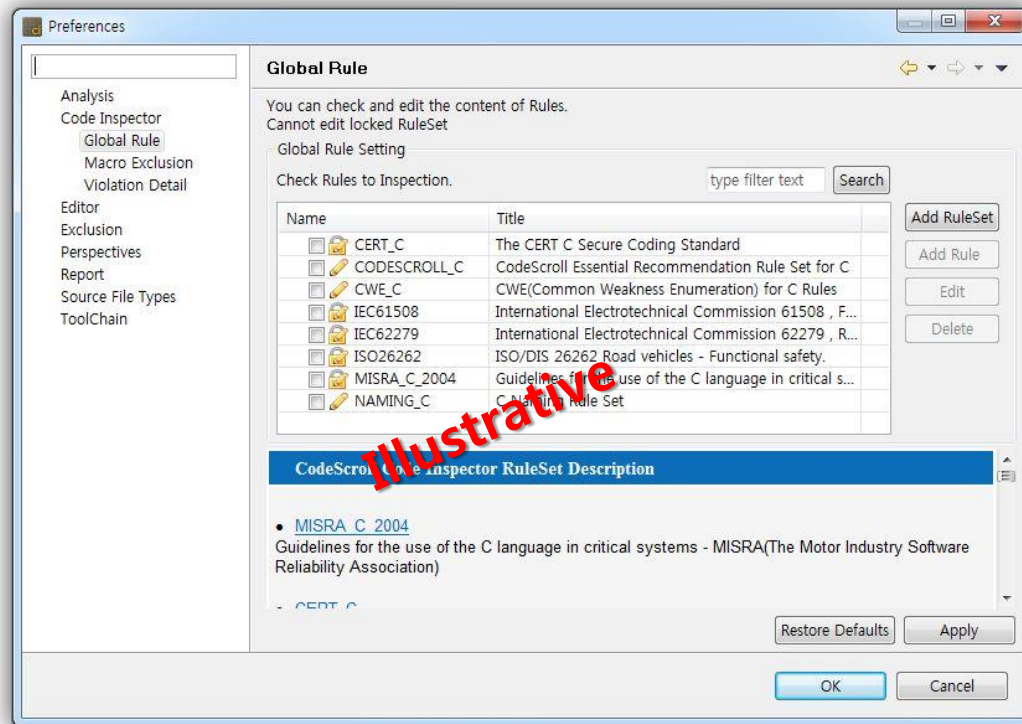
					Total
31	34	79	216	0	360
31	30	76	207	0	344
0	4	3	9	0	16
0	0	0	0	0	0

Violations by RuleSet

SureSoft	MISRA 2004	N/A	Etc.	Total
214	146	N/A	N/A	360
207	137	N/A	N/A	344
7	9	N/A	N/A	16
0	0	N/A	N/A	0

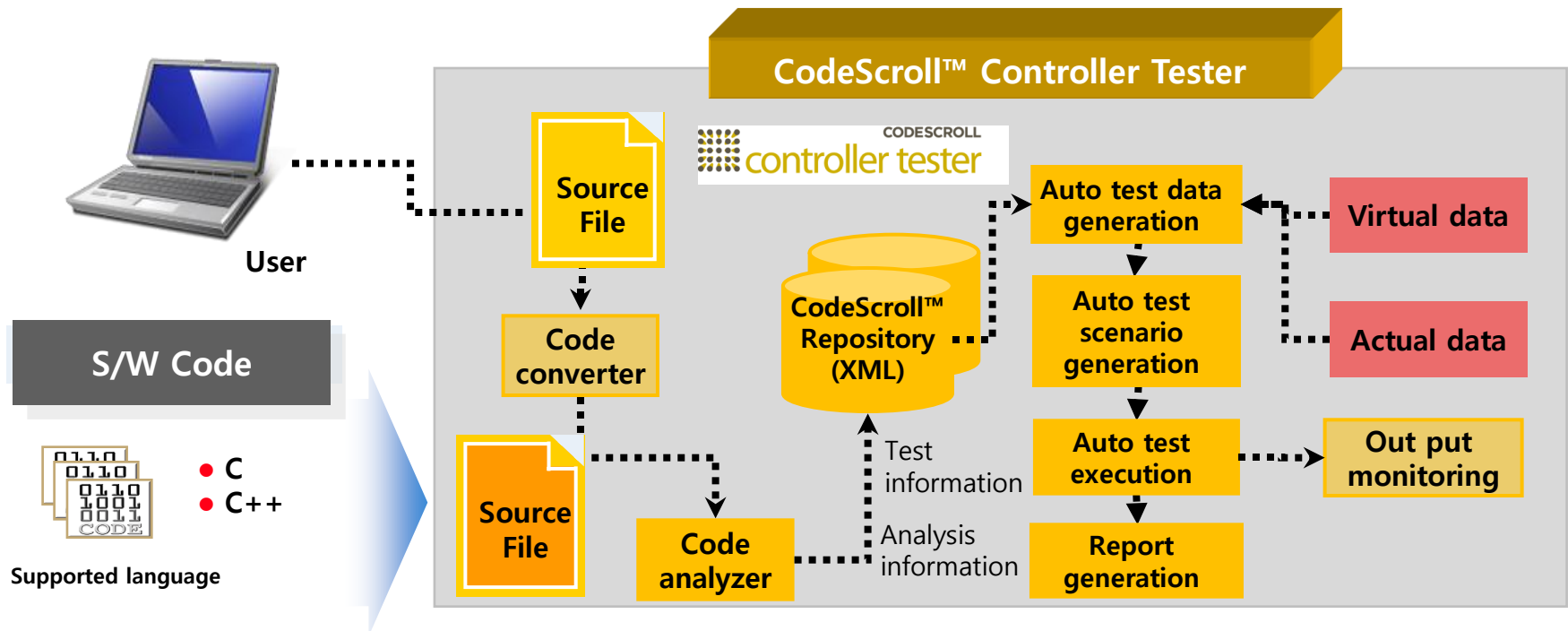
Code Inspector's Key Features #4

- Support International Standards
 - Provide rule-set based on international standards (MISRA C/C++, IEC-61508, IEC-62279 and etc.)
 - Provide severity criteria based on international standard(define priority for debugging)
 - Provide guide for how to improve or modify the source code to make satisfy the rule



CodeScroll™ Controller Tester

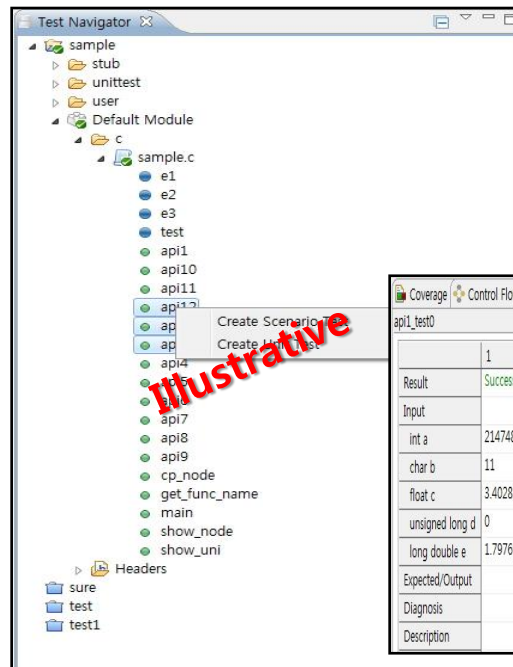
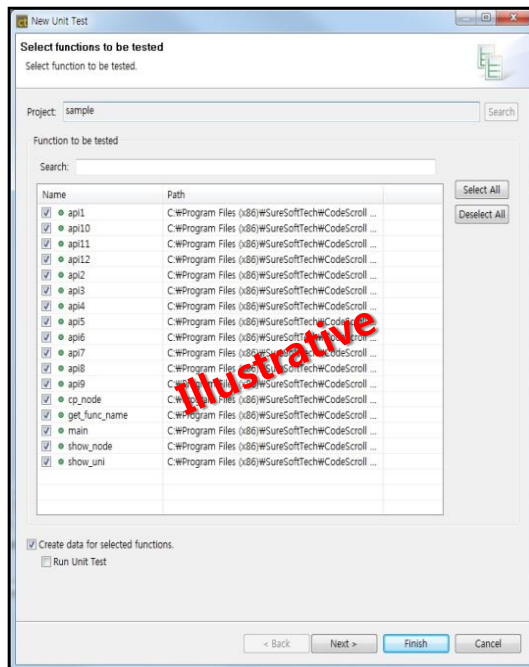
- Support unit test and integration test through providing test execution environment
- Generate test case automatically by analyzing source code, and manage it easily [GUI, EXCEL]
- Support various test data combination [Flat, Pairwise, Random]
- Generate test result report automatically, formatted based on IEEE 829



Controller Tester's Key Features #1

■ Create Test

- Prepare test data and test code for testing functions of source code
 - Create Unit test
 - Create test data and test code for each function of user source
 - Create Scenario test (integration test)
 - Make several functions into one test, and can specify execution cycle and sequence



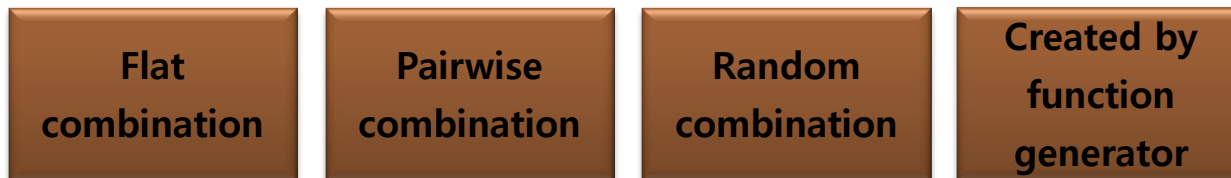
Illustrative

	1	2	3	4	5	6	7	8	9
Result	Success	Success	Success	Success	Success	Success	Success	Success	Success
Input									
int a	2147483647	0	11	-1	10	50	51	-2147483648	1
char b	11	10	127	0	51		-128	1	50
float c	3.40282e+038	0	3.40282e+038	-3.40282e+038	0		-3.40282e+038	3.40282e+038	-3.40282e+038
unsigned long d	0	0	10	1	1	50	51	4294967295	11
long double e	1.79769e+308	-1.79769e+308	-1.79769e+308		1.79769e+308	0	-1.79769e+308	1.79769e+308	0
Expected/Output									
Diagnosis									
Description									

<Example of scenario test creation>

Controller Tester's Key Features #2

- Automatic Generation/Management of test cases
 - Through analyzing source code, find suitable test data which can test possible path of source code.
 - Support automatic generating abnormal test case
 - Test Data Combination → Test Cases



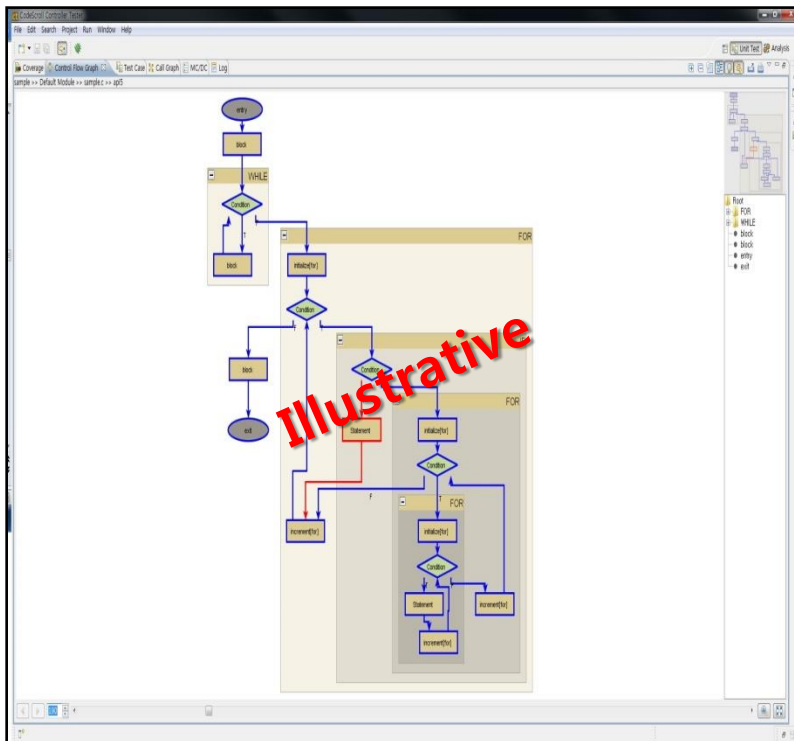
- Increase reusability of test case (MS-Excel) and use them in regression test.

Test Cases					
api12_test1					
	1	2	3	4	5
Results	Success	Success	Success	Fail	Success
Inputs					
signed char c	-128	0	1	-1	127
Expected Value / Actual Value					
api12_ret0	!-128/1	0/1/1	0~1/1	0&1/1	1~10/1
Verdict					
Description					

	A	B	C	D	E	F
1	CodeScroll Unit Tester(Controller Tester) Test Data					
2	test name:api10_test1					
3		1	2	3	4	5
4	<input>					
5	a	1	2147483647	-2147483648	-1	0
6	b	127	-128	0	-1	1
7	c	2147483647	1	0	-1	-2147483648
8	d	1	-2147483648	0	-1	2147483647
9	e	0	-2147483648	-1	2147483647	1
10	f	1	-128	-1	127	0
11	<expect>					
12	api10_ret0					
13	<output>					
14	api10_ret0	40	40	40	40	40

Controller Tester's Key Features #3

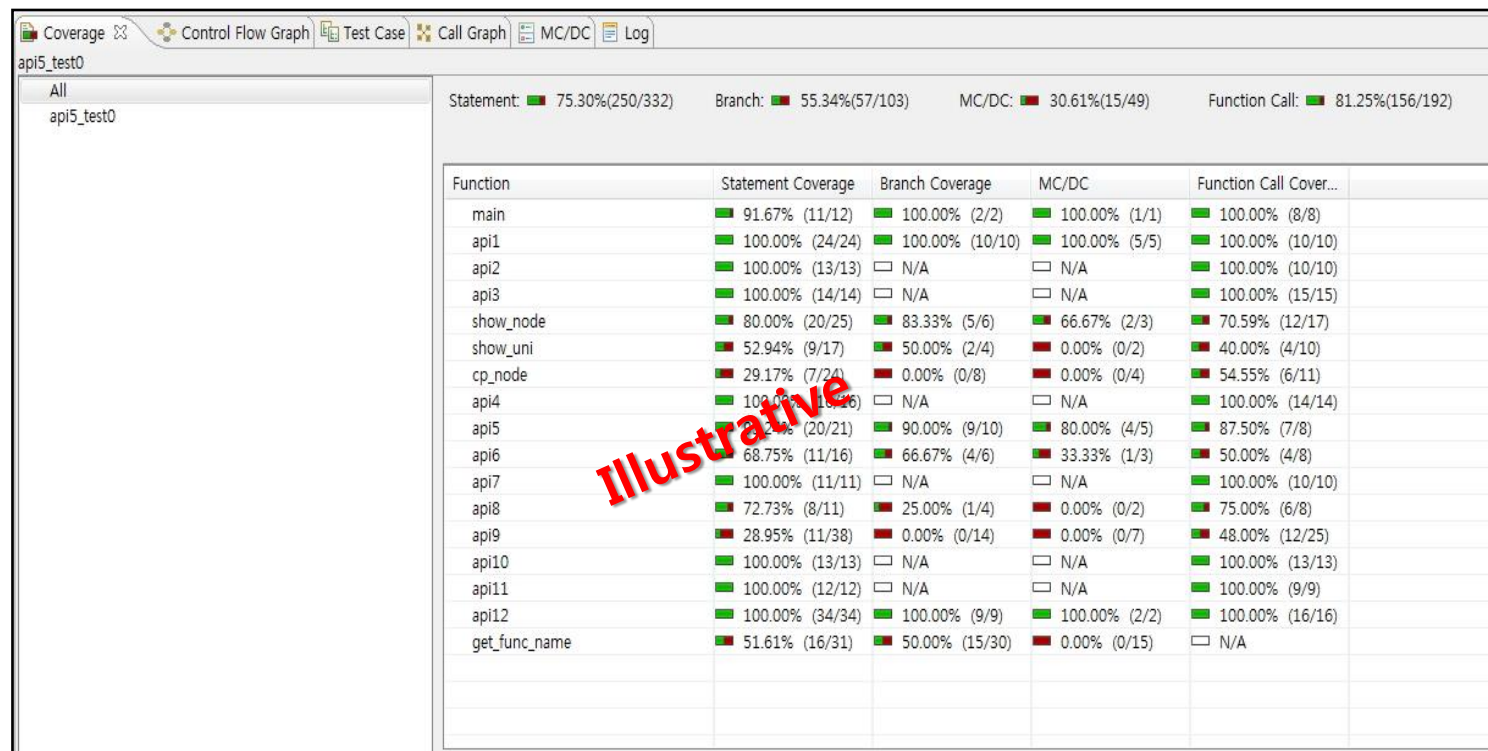
- Additional design of test case
 - Improve coverage by designing additionally test case for checking not-executed part within control flow graph and source code



```
130 void show_node(char *old_indent, NodePtr node) {
131 {
132     int i;
133     char *indent;
134     indent = (char *) calloc ( 1000, sizeof (char) );
135
136     printf("===== void show_node(char *old_indent, NodePtr node) Input =====\n");
137     sprintf(indent, "%s", old_indent );
138
139     if (node == (void *)0) {
140         printf ("%sNodePtr node : NULL\n", indent);
141         return;
142     }
143
144     printf ("%senum enml node->a (1,4,7,8): %d\n", indent, node->a);
145     printf ("%senum enml node->a (White, Black, Gray): %s\n", indent, e1[node->a]);
146     printf ("%sint node->b: %d\n", indent, node->b);
147     printf ("%sunsigned int node->c: %d\n", indent, node->c);
148     printf ("%schar * node->d : %s\n", indent, (node->d) ? (node->d) : "NULL");
149     for ( i=0; i<5; i++) {
150         printf ("%sfloat node->e[%d] (size 5): %f\n", indent, i, node->e[i] );
151     }
152     if ( node->next != (NodePtr) NULL ) {
153         printf ("%sstruct * node->next: %x\n", indent, node->next );
154         show_node (indent, node->next);
155     } else {
156         printf ("%sstruct * node-> next: NULL\n", indent);
157     }
158     printf ("===== Input end =====\n");
159
160     printf ("\n===== void show_node(char *old_indent, NodePtr node) Output =====\n");
161     printf ("void\n");
162     printf ("===== Output end =====\n");
163 }
```

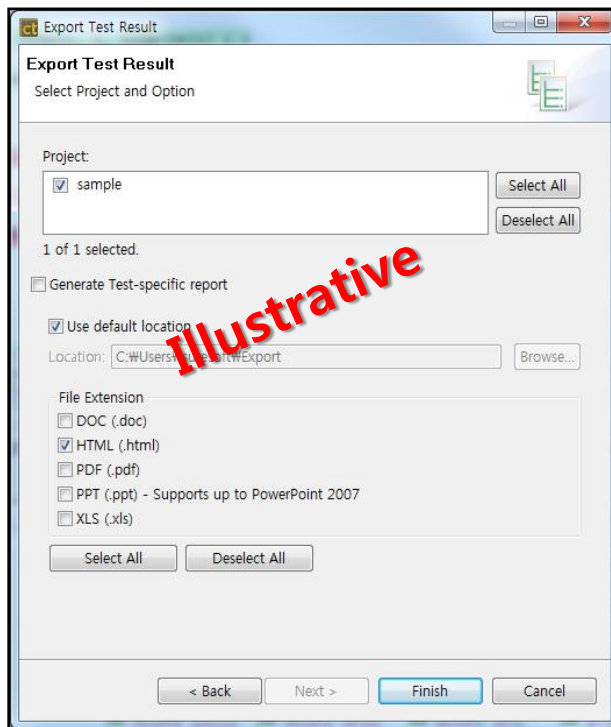

Controller Tester's Key Features #4

- Test Result(Coverage)
 - Provide various coverage (Statement, Branch, MC/DC, Function Call)
 - Total Coverage
 - Coverage for each tested function



Controller Tester's Key Features #5

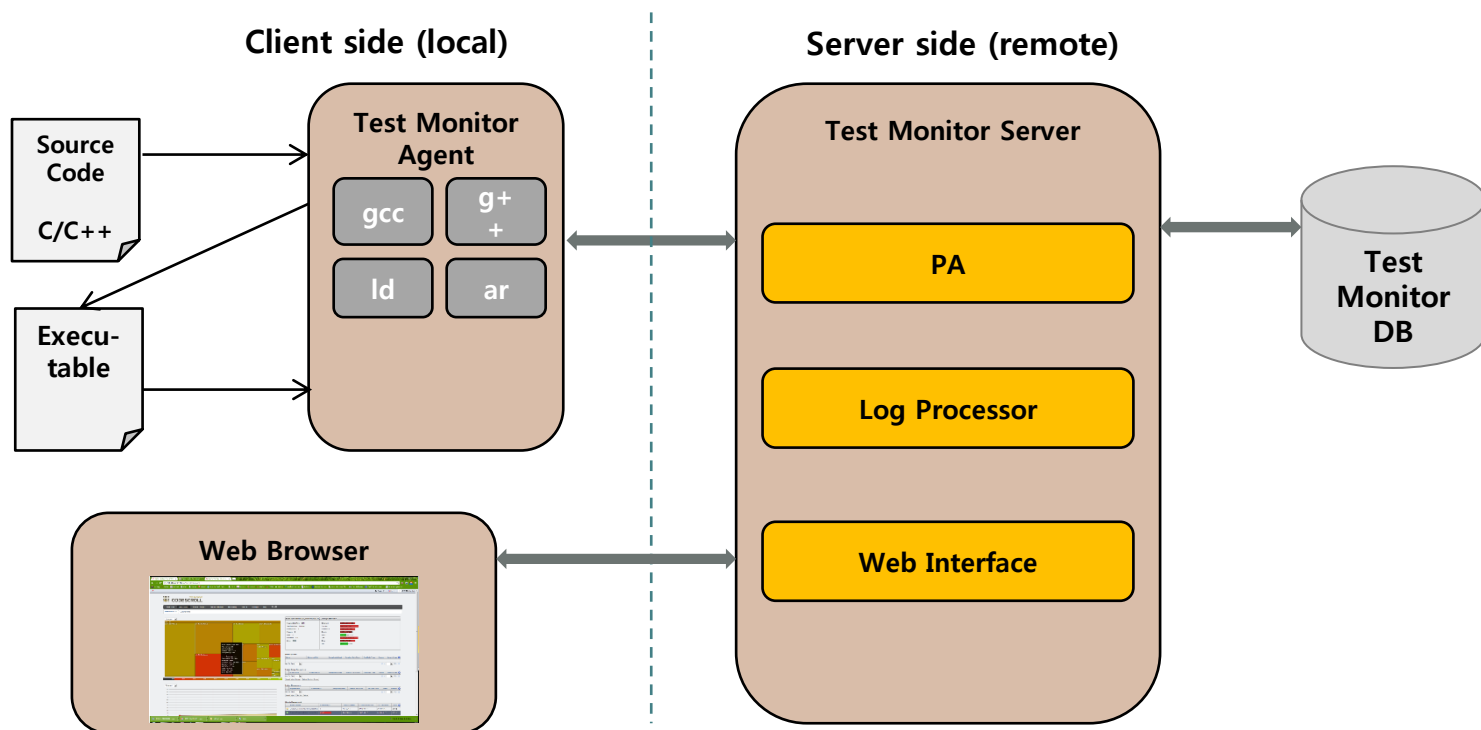
- Test Result(Report)
 - Support various report formats (DOC, HTML, PDF, PPT, XLS)
 - Create reports for each test
 - Provide the feature for generating the document for test design(STD) and test result(STR)
 - Can be used for certification (ISO 26262, DO-178B/C, IEC 62279, etc)



Project: sample (C/C++)								2013-06-20 09:41:14.604	
Total Coverage		Statement Coverage		Branch Coverage		Call Coverage		MC/DC	
75.30 %		55.34 %		61.25 %		39.61 %			
Test summary									
Test	Success	Error	Failure	Statement	Branch	Call	MC/DC		
api10_test0	5			3.92 %	0.00 %	6.77 %	0.00 %		
api11_test0	5			3.61 %	0.00 %	4.69 %	0.00 %		
api12_test0	12			10.24 %	8.74 %	8.33 %	4.08 %		
api1_test0	9			7.23 %	9.71 %	5.21 %	10.20 %		
api2_test0	4	1		3.92 %	0.00 %	5.21 %	0.00 %		
api3_test0	5			3.92 %	0.00 %	7.81 %	0.00 %		
api4_test0			1	10.84 %	4.85 %	13.54 %	4.08 %		
api5_test0				6.02 %	8.74 %	3.65 %	8.16 %		
api6_test0	3			3.31 %	3.88 %	2.08 %	2.04 %		
api7_test0		5		6.63 %	0.97 %	9.38 %	0.00 %		
api8_test0	1			2.41 %	0.97 %	3.13 %	0.00 %		
api9_test0		8		11.45 %	15.53 %	10.42 %	0.00 %		
cp_node_test0		7		7.53 %	3.88 %	8.85 %	2.04 %		
get_func_name_test0	1			4.82 %	14.56 %	0.00 %	0.00 %		
main_test0	3	2		9.94 %	6.80 %	9.38 %	6.12 %		
show_node_test0		7		5.42 %	3.88 %	5.73 %	2.04 %		
show_uni_test0		8		2.71 %	1.94 %	2.08 %	0.00 %		
Function Coverage									
Function	Statement Coverage	Branch Coverage	Call Coverage	MC/DC					
main	91.67 %	100.00 %	100.00 %	100.00 %					
api1	100.00 %	100.00 %	100.00 %	100.00 %					
api2	100.00 %	N/A	100.00 %	N/A					
api3	100.00 %	N/A	100.00 %	N/A					
show_node	80.00 %	83.33 %	70.59 %	66.67 %					
show_uni	52.94 %	50.00 %	40.00 %	0.00 %					
cp_node	29.17 %	0.00 %	54.55 %	0.00 %					

CodeScroll™ Test Monitor

- Measuring code coverage which is a typical criteria for measuring test quality
- Not necessary to install separate clients as web-based tool
- Deal with building of distribution environment and measure various coverage easily
- Provide a source-level execution information for additional test design





Test Monitor's Key Features #1

- Provide various coverage
 - Statement, Entry, Exit, Function, Line, Branch(Decision), MC/DC, Function-call
- Various visualization
 - Coverage–Complexity Tree Map: Identify test weakness factors
 - History-Chart: Show coverage change over time
 - Bar-Chart: Show coverage highlighting depending on reference value
- Centralized source code view
 - Support high-lighting statement, code folding
 - Can check the related information of test execution in one view
- View customization
 - Screen configuration, arrangement and displayed components can be set freely
 - Customized logical unit's coverage statistics
- Deal with complex build/execution configuration
 - Support to process log for previous shape
 - Support multiple build/execution server

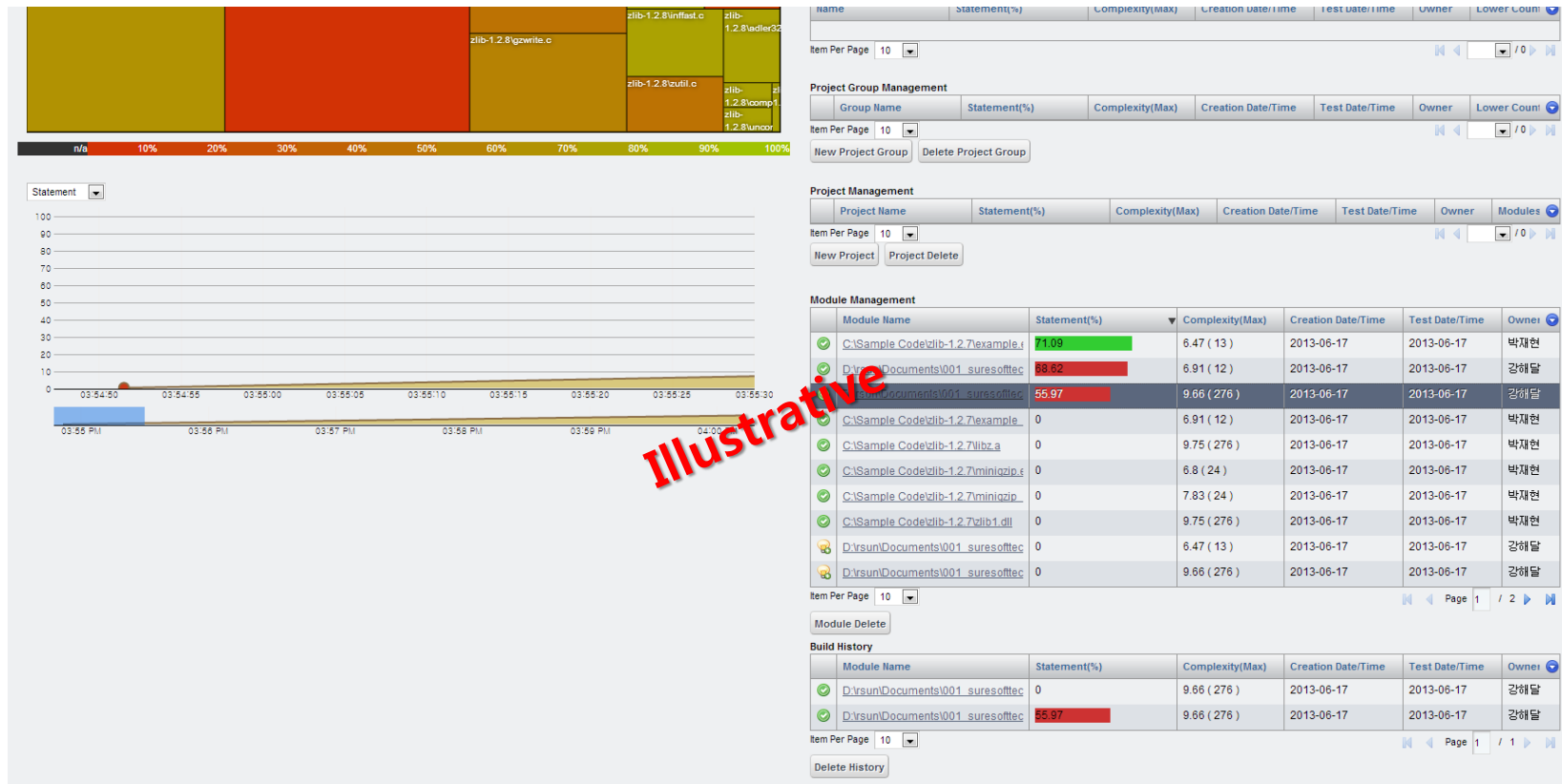
•

- Provide web-based interface for checking coverage
 - Provide interface for integrating and managing coverage of multiple modules
 - Provide various visualization information



Test Monitor's Key Features #3

- Accumulate and manage module's coverage change
- Manage module build history and coverage measurement history



Test Monitor's Key Features #4

■ Source View

- Various coverage measurements (function, line, statement, branch, MC/DC, entry, exit)
- Provide additional test case design information by displaying the coverage information directly in source code

The screenshot displays the Test Monitor interface. On the left, a 'Functions' list shows various functions with their coverage percentages. The main window on the right shows the source code for 'zlib-1.2.8/trees.c'. A table at the top right of the main window provides summary coverage data:

Name	Statement(%)	Function(%)	Branch(%)
zlib-1.2.8/trees.c	77.2	90.91	75.26

Below this, a 'Functions' table shows coverage for individual functions in the file:

Name	Statement(%)	Branch(%)
bi_flush(struct internal_state *)	55.87	75
_tr_stored_block(struct internal_state *, char *, unsigned long, int)	45.45	50
gen_bfllen(struct internal_state *, struct tree_desc_s *)	53.16	46.15
bi_windup(struct internal_state *)	100	75
copy_block(struct internal_state *, char *, unsigned int, int)	100	75
send_tree(struct internal_state *, struct ct_data_s *, int)	89.72	72.22

The source code view shows lines of C code with colored bars indicating coverage status. A legend at the bottom explains the colors:

- No Statement (Grey)
- Covered (Green)
- Partial Covered (Yellow)
- Uncovered (Red)
- Fully Covered (Dark Green)
- True Covered (Light Green)
- False Covered (Light Yellow)

- - **V&V Services**

- ◆ Overview
- ◆ Business Stories

Overview

■ Verification and Validation of Mission-critical SW

Automobile

- EMS, HCU, TMS, etc.*
- V&V Doc. Generation Tool required by ISO 2626

Defense

- Korean Wheeled Armored Vehicle
- Joint Tactical Data Link System

Unmanned Aerial Vehicle

- Qplus-AIR/653 Avionics Application
- DO-178B Certification

Finance

- Next-generation Insurance Product Development System



* EMS: Engine Management System, HCU – Hybrid Control Unit, TMU-Transmission Management System



Business Story - Automotive

- Customer: Hyundai Motors
- Duration: 2008 ~ Now
- Product or Service: Independent test for controller development
- Success Story:
 - Hyundai motors' new cars adopts many software-controlled parts
 - The controllers are developed by contractors or Hyundai motors' R&D
 - Suresoft tests controllers with its own test tools to find defect prior to production for both contractors and Hyundai motors
 - Applied for navigation, audio, battery, steering, powertrain, engine, etc..
 - Found critical bugs that might've caused recalls



Business Story - Avionics

- Customer: Elec. & Telecom. Res. Inst. & Korea Aerospace Ind.
- Duration: 2011 ~ Now
- Product or Service: Independent test for Qplus-AIR/653, an ARINC-653 Compliant Avionics SW
- Success Story:
 - ETRI developed avionics SW for new drone(UAV) for KAI
 - The SW was required to comply to ARINC-653 functional requirements and should satisfy quality requirements of DO-178B
 - Suresoft tested the SW for the compliance to DO-178B, leading testing activities and working with DER for the certification
 - Qplus-AIR/653 was certified by FAA



Business Story - Defense

- Customer: Agency for Defense Development (ADD)
- Duration: 2012 ~ Now
- Product or Service: V&V of Joint Tactical Data Link System
- Success Story:
 - Korean military developed a joint tactical data link to be used among many defense systems to exchange data
 - ADD implemented a prototype SW according to JTDLS
 - Suresoft provided service test JTDLS implementation
 - The service included static source code analysis, unit test and conforms to the V&V requirement by Defense Acquisition Program Administration



Business Story - Finance

- Customer: NH Bank
- Duration: 2008 ~ Now
- Product or Service: Provide corporate testing tools
- Success Story:
 - NH bank is one of Korea's large banks.
 - Suresoft provided testing tools for NH corporate
 - The testing tools were used in developing next-generation banking system by NH Bank and NH card.
 - Suresoft also provided testing services for those projects using the tools
 - The time to migrate was minimized by using legacy operation log to test new system automatically
 - The system opened on schedule

Experiences

Mission Critical

Enterprise Software






































Embedded Software



Customers

❑ Suresoft's products improve Customer's SW quality

Auto-motive	 HYUNDAI	 MOBIS	 AutoEver	 LG화학	 SL Corporation
	 SSANGYONG MOTOR	 MANDO Corporation	 JH N (주) 타이어차원 CORPORATION	 MOTOTECH	 kyungshin
	 SHINCHANG	 OMRON AUTOMOTIVE ELECTRONICS KOREA CO., LTD	 TE connectivity	 cobra	 M (주) 엠앤소프트
Defense	 HYUNDAI Rotem	 Agency for Defense Development	 SAMSUNG THALES	 DAPA Defense Acquisition Program Administration	 LIG Nex1
UAV	 ETRI Electronics and Telecommunications Research Institute	 KAI KOREA AEROSPACE INDUSTRIES, LTD.	 Agency for Defense Development	 DAPA Defense Acquisition Program Administration	 DTAQ 국방기술품질원 Defense Agency for Technology and Quality
Finance	 koscom	 NH NongHyup	 wooribank	 truefriend 한국투자증권	 Kyongnam Bank
	 Hanwha Life	 Hanwha Investment & Securities	 SAMSUNG SAMSUNG FIRE & MARINE INSURANCE	 KFTC Korea Financial Telecommunications & Clearing Institute	 LOTTECARD

Partners

❑ With partners, Suresoft is realizing the dream

Research	      
Service	 
Marketing (Global)	 
Marketing (Korea)	 

Thank you for your kind attention



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