Soft 4 Soft

RESORT Code Analysis

Soft4Soft

Static Analysis
Software Testing
Firmware Testing
Reverse Engineering

RESORT Static Analysis & Testing Toolset

SW Consulting Service

We are looking for business partners in US, EU, Japan, Asia, and so on.

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RESORT Code Analysis

RESORT Static Analysis Tool

RESORT static analysis finds defects and vulnerabilities of code by analyzing and inferring the state of code execution based on the generated paths through the correctness of data-flow analysis according to the correct order of execution of subprograms and functions within the whole program.

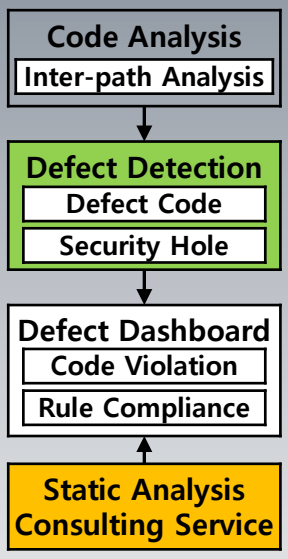
❑ Static Analysis Tool

- C, C++, C#, Java(JSP), R, Python, JavaScript, Flex, ABAP
- (Swift, Objective-C)
- Android (Kotlin, Android-Java)

❑ *IDE Plug-in*

- Eclipse, Intellij, Android Studio, Visual Studio, Xcode, UtraEdit, etc.
- Jenkins, etc.

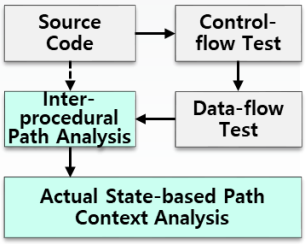
❑ Static Analysis Process



❑ Static Tool Certification

- ISO 26262, 9001
- IEC 61508
- IRC 62279/EN 50128
- CWE Compatibility

❑ RESORT Static Analysis Techniques



❑ Static Analysis Features

- **(no Compile Step)** Source code analysis without the compile build step
- **(no False Positive)** Source code analysis based on Inter-procedural path analysis
  - (defect message) Sentence and location message of the defect's cause
- **(no Rule Option)** No need to set option due to path-based code context analysis
- **(Rule Design)** "One Guide to One Rule" rule design (to prevent duplicate rule)
  - (rule naming) Original standard name, such as MISRA, CWE

Coding Standards

- MISRA-C(2023, 2012), MISRA-C++(2023, 2008), AUTOSAR C++14 , JSF++, etc.
- Automotive Embedded C, C++ Coding Guide Compliance
- Other Coding Standards: JavaScript, Python, R, ABAP, Mobile(iOS, Android)

Safety (Run-time Analysis)

- CWE-658(for C), CWE-659(for C++), CWE-660(for Java)
- Automotive Embedded Run-time Compliance: C, C++

Security (Security Vulnerability)

- CWE, OWASP, CERT: C, C++, Java
- Automotive Embedded Security Compliance: C, C++, Java

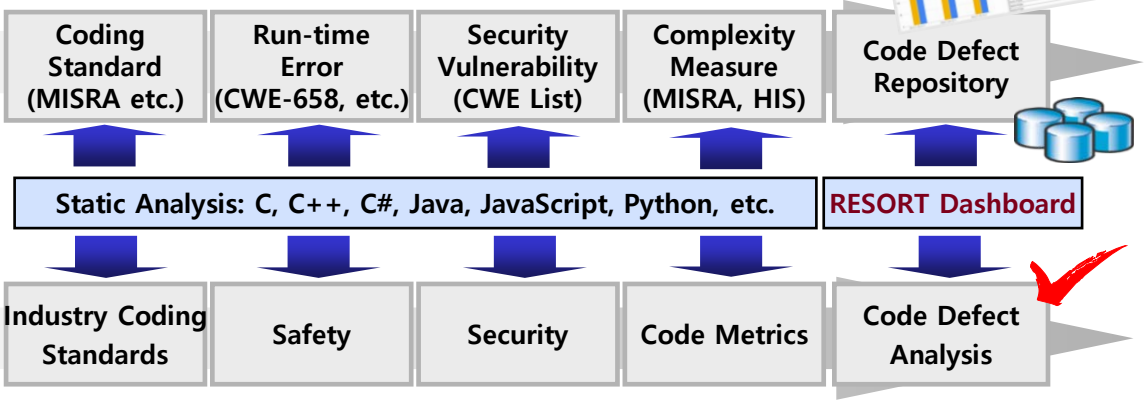
Code Metrics (Complexity)

- MISRA Software Metrics: C, C++, C#, Java
- HIS Source Code Metrics: C, C++, C#, Java

Software Safety Compliance

- ISO 26262(automotive), IEC 61508(electrical/electronic),
- IEC 62279/EN 50128(railway), etc.
- EU CRA(Cyber Resilience Act, Cybersecurity)

RESORT Static Analysis Compliance



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RESORT Code Analysis

RESORT Software Testing Tool

❑ SW Testing Tool

- C, C++, C#, Java
- Automated White-box Path Test / Path-based Fault Injection Test
- GUI Test

❑ Supported Compilers

- C/C++/C# test supports all compiler families based on Big-bang approach

❑ Testing Process

Test Environment
- RESORT Compile
- HOST/Target Compile

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Test Data Design
- Path Test Case
- Path Instrument

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Test Evaluation
- Code Coverage
- MBD Verification

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Software Testing & Consulting Service

❑ Testing Tool Certification

- IEC 62279, ISO 9001

❑ RESORT Test Case Design Techniques

- It is a **data-flow testing technique** that automatically extracts test cases based on the generated paths through data-flow analysis

RESORT software testing is an automated white-box path testing tool that measures the percentage of code coverage for all code statements using the automatically generated paths and test cases through the correctness of data-flow analysis for the program's internal logic.

❑ Software Testing Features

- **(Testing Environment)** Host/Target-based Software Testing Automation
- **(White-box Path Testing)** Source Code-based White-box Path Testing
  - (test design) Path-based test cases (input value) generation for each function
  - (one workflow) Path-based fault injection testing integrated with white-box test
- **(GUI Testing)** Binary Code based Desktop/Web/Mobile GUI SW Testing
  - (test design) UI requirements scenario test for Windows, Web, Mobile GUI SW
  - (one workflow) Multi-architecture(client-server) applications testing
  - (UI verification) System function/performance/interface verification of GUI SW

White-box Path Testing (Unit/Integration)

- Path and Instrument Test based White-box Path Testing
- Code Coverage based on Automatically Generated Test Cases for each of Paths

GUI Testing (UI Test)

- Instrument Test based GUI Testing
- Code Coverage based on the execution of GUI SW (client-server applications)

Code Coverage

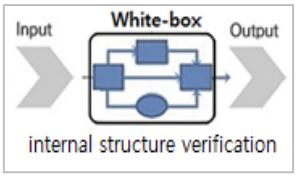
- Structural Coverage: Statement, Branch, MC/DC, Path, Function, Call Coverage
- Scenario Coverage: Design & Component Scenario Coverage
- Requirement Coverage: Requirement Traceability & Consistency Coverage

Model-Based Design(MBD) Verification

- (test-to-path) Path Verification of Branch & MC/DC Coverage: Control-flow Graph
- (test-to-scenario) Component Verification of Scenario Coverage: Call/File Graph
- (test-to-code) Marking the Type of Structural Coverage in the Tested Code View

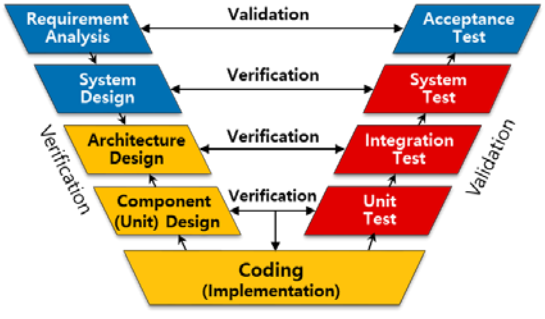
Software Test Standards Compliance

- ISO 26262, IEC 62279/EN 50128, IEC 61508, etc.
- EU CRA(Cyber Resilience Act: Cybersecurity)



White-box Testing Verification

- Improved Reliability and Robustness
- Higher Cybersecurity
- Save on Costs (Automated Generation of Test Cases & MBD Verification)



RESORT Software & Firmware Testing		
Host & Target	Methods	Benefits
(Host) Source code . White-box Path Test	Unit Integration	.Structural .Robustness
(Target) Binary Code . GUI Test . Firmware Test	Integration System	.Scenario .Stability .Performance

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RESORT Firmware Testing Tool

RESORT firmware testing is a binary code-based firmware integration testing tool that verifies the protocol scenarios and measures the percentage of code coverage for the execution and operation of firmware on target ECU/MCU boards using communication protocol scenarios as input devices.

❑ Firmware Testing Tool

- C, C++, C#
- Firmware Test

❑ Supported Compilers

- C/C++/C# test supports all compiler families based on Big-bang approach

❑ Testing Process

Test Environment
- RESORT Compile
- Workbench Compile

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Test Data Design
- Code Instrument
- Protocol Scenario

↓

Test Evaluation
- Code Coverage
- MBD Verification

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Firmware Testing & Consulting Service

❑ Testing Tool Certification

- IEC 62279, ISO 9001

❑ IEC 62279 SW Certification Documentation Service (A.3~6)

- SW Architecture
- SW Design
- SW Implementation
- Verification and Testing
- Integration Testing
- SW&HW Integration Testing

❑ Firmware Integration Testing Features

- **(Testing Environment)** Target-based Firmware Testing Automation
- **(Firmware Testing)** Binary code based Firmware Testing on the target ECU/MCU
  - (one workbench) Firmware testing workflow integrated with embedded workbench (IAR, Code Composer Studio, Microchip Studio, KEIL, etc.)
  - (test design) Architecture and protocol specification-based test scenario design
  - (input device) UART communication protocol scenarios
  - (protocol verification) Function/interface/performance verification of Firmware based on architecture design specification

Firmware Testing

- Instrument Test based Firmware Integration Testing
- UART(RS-232, 422, 485) Communication Protocol Scenario Test
- Code Coverage based on the CPU's history of the target ECU/MCU boards

Code Coverage

- Structural Coverage: Statement, Branch, MC/DC, Path, Function, Call Coverage
- Scenario Coverage: Design & Component Scenario Coverage

Model-Based Design(MBD) Verification

- (test-to-scenario) Component Verification of Scenario Coverage: Call/File Graph
- (test-to-code) Marking the type of Structural Coverage in the Tested Code View

Firmware Testing Standards Compliance

- ISO 26262, IEC 62279/EN 50128, IEC 61508, etc.
- EU CRA(Cyber Resilience Act: Cybersecurity)

Firmware Testing Verification

- Improved Reliability and Stability
- Optimized Performance Verification
- Higher Cybersecurity
- Save on Costs(Test Integration with Embedded Workbench (IAR, CCSTUSIO, KEIL))

One RESORT Firmware Workbench

RESORT Firmware Testing Tool

Target MCU Board

Embedded Workbench

Protocol Transmit