FIO38-C. Do not copy a FILE object

According to the C Standard, 7.21.3, paragraph 6 [ISO/IEC 9899:2011],

> *The address of the FILE object used to control a stream may be significant; a copy of a FILE object need not serve in place of the original.*

Consequently, do not copy a FILE object.

Noncompliant Code Example

This noncompliant code example can fail because a by-value copy of stdout is being used in the call to fputs():

```
#include <stdio.h>

int main(void) {
  FILE my_stdout = *stdout;
  if (fputs("Hello, World!\n", &my_stdout) == EOF) {
    /* Handle error */
  }
  return 0;
}
```

When compiled under Microsoft Visual Studio 2013 and run on Windows, this noncompliant example results in an "access violation" at runtime.

Compliant Solution

In this compliant solution, a copy of the stdout pointer to the FILE object is used in the call to fputs():

```
#include <stdio.h>

int main(void) {
  FILE *my_stdout = stdout;
  if (fputs("Hello, World!\n", my_stdout) == EOF) {
    /* Handle error */
  }
  return 0;
}
```

Risk Assessment

Using a copy of a FILE object in place of the original may result in a crash, which can be used in a denial-of-service attack.

Rule	Severity	Likelihood	Remediation Cost	Priority	Level
FIO38-C	Low	Probable	Medium	**P4**	**L3**

Automated Detection

Tool	Version	Checker	Description
Astrée	19.04	**file-dereference**	Partially checked
Axivion Bauhaus Suite	6.9.0	**CertC-FIO38**	Fully implemented
Clang	3.9	misc-non-copyable-objects	Checked with clang-tidy
Compass/ROSE			Can detect simple violations of this rule
Coverity	2017.07	**MISRA C 2012 Rule 22.5**	Partially implemented
LDRA tool suite	9.7.1	**591 S**	Fully implemented
Parasoft C/C++test	10.4.2	**CERT_C-FIO38-a**	A pointer to a FILE object shall not be dereferenced
Polyspace Bug Finder	R2019b	CERT C: Rule FIO38-C	Checks for misuse of a FILE object (rule fully covered)

PRQA QA-C	9.5	**1485, 5028**	
PRQA QA-C++	4.3	**5013**	
RuleChecker	19.04	**file-dereference**	Partially checked

Related Vulnerabilities

Search for vulnerabilities resulting from the violation of this rule on the CERT website.

Related Guidelines

Key here (explains table format and definitions)

Taxonomy	Taxonomy item	Relationship
ISO/IEC TS 17961:2013	Copying a `FILE` object [filecpy]	Prior to 2018-01-12: CERT: Unspecified Relationship

Bibliography

[ISO/IEC 9899:2011]	7.21.3, "Files"