

Secure Coding in C and C++

Exercise #2: Integer Review

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Integer Review

Review the code:

- manual code reading
- compile and test

Use reference material:

- C standard
- man / help pages
- CERT Secure Coding standards
- *Secure Coding in C and C++*

Identify defects involving **integer** operations and

- note line number of defect
- note specific problem
- optionally reference C or CERT Secure Coding standard

Exercise

Find integer
defects
(30 minutes)



The `fscanf()` Function

```
fscanf(in, "%i", &size);
```

The `fscanf()` function returns the value of the macro `EOF` if an input failure occurs before any conversion.

Otherwise, the function returns the number of input items assigned, which can be fewer than provided for or zero in the event of an early matching failure.

For more information, see

[ERR34-C. Detect errors when converting a string to a number](#)

Integer Overflow

```
sigdb = malloc(  
    size * sizeof(struct sigrecord)  
);
```

Multiplication of an untrusted value (size), which is then used in a memory allocation.

The `fgetc()` Function

```
char c;  
while ((c = (char)fgetc(in)) != EOF) {
```

FIO34-C. Use `int` to capture the return value of character IO functions.

- Do not convert the value returned by a character input/output function to `char` if that value is going to be compared to the EOF character.
- Once a character has been converted to a `char` type, it is indistinguishable from an EOF character.

Negative Indices

This code allows negative indices:

```
int idx = atoi(input);  
if (idx < size) {  
    printf(  
        "%d %s %s\n",  
        sigdb[idx].signum,  
        sigdb[idx].signame,  
        sigdb[idx].sigdesc  
    );  
}
```


Logic Error

% 5

6 ABRT Abort

% 7

8 FPE Floating point exception

% 8

9 KILL Killed

% hithere

1 HUP Hangup

% asdfasd

1 HUP Hangup

% 6

7 EMT EMT trap

% asdfasd

1 HUP Hangup

Off-by-one error on retrieving signal number (bug, but not vulnerability)

Non-numeric input causes 0th array element to be printed.

The `atoi()` Function

```
idx = atoi(input);
```

`atoi()` and related functions lack a mechanism for reporting errors for invalid values.

Specifically, the `atoi()`, `atol()`, and `atoll()` functions

- do not need to set `errno` on an error
- have undefined behavior if the value of the result cannot be represented

Questions

