Secure Software Design

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Spring 23 - Week 10

Changes in the Second Half

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1. Weeks 14 and 15, no class. Work on the final instead.
2. Code analysis moving to supplemental lecture
3. Dropping the Session Design assignment.
   3.1 5 more points to input validation
   3.2 If this would impact your grade, talk to me

Secure Programming

Outline

- Difficulties
- Attacks
- Common Vulnerabilities

Why is it Difficult?

Vulnerabilities are Bugs

Malicious Influence

Vulnerability Chains

Vigilance

GotoFail Revisited

All code in this section under:

```
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   OF ANY KIND, EITHER
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* @APPLE_LICENSE_HEADER_END@
*/
```

Each call to SSLHashSha1.update must match an expected value to properly authenticate.

```
if ((err = SSLHashSha1.update(&hashCtx, &clientRandom)) !=
    goto fail;
if ((err = SSLHashSha1.update(&hashCtx, &serverRandom)) !=
    goto fail;
    goto fail;
if ((err = SSLHashSha1.update(&hashCtx, &signedParams)) !=
    goto fail;

// -- SNIP -- //

fail:
    SSLFreeBuffer(&signedHashes);
    SSLFreeBuffer(&hashCtx);
    return err;
```

The Problem: Structure by Syntax

```
if ((err = SSLHashSha1.update(&hashCtx, &serverRandom)) !=
    goto fail;
    goto fail;
```

Is syntactically equivalent to:

```
if ((err = SSLHashSha1.update(&hashCtx, &clientRandom)) !=
    goto fail;
}

goto fail;
```

Mitigation

Remove one of the goto fail; lines.

```
if ((err = SSLHashSha1.update(&hashCtx, &clientRandom)) !=
    goto fail;
```

GotoFail Commentary

Footguns

Vulnerabilities

Atomicity

Timing Attacks

Serialization

The Usual Suspects

Fixed-Width Integer Vulnerabilities

Floating-Point Precision Vulnerabilities

Examples: Underflow and Overflow

Safe Arithmetic

Memory Management

Buffer Overflow

Leaking Memory

Questions?

Next Time

- Untrusted Input
- Input Validation
- Injections