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C# static code analysis

Unique rules to find Bugs, Vulnerabilities, Security Hotspots, and Code Smells in your C# code

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be used with "ExportAttribute"
Bug

"ConstructorArgument" parameters should exist in constructors
Bug

Windows Forms entry points should be marked with STAThread
Bug

Collection elements should not be replaced unconditionally
Bug

Exceptions should not be created without being thrown
Bug

Collection sizes and array length comparisons should make sense
Bug

Serialization event handlers should be implemented correctly
Bug

Deserialization methods should be provided for "OptionalField" members
Bug

All branches in a conditional structure should not have exactly the same implementation
Bug

Types should be defined in named namespaces
Bug

Empty nullable value should not be accessed
Bug

Nullable type comparison should not be redundant

Using clear-text protocols is security-sensitive

Analyze your code

Security Hotspot | Critical | cwe owasp

Clear-text protocols such as `ftp`, `telnet` or non-secure `http` lack encryption of transported data, as well as the capability to build an authenticated connection. It means that an attacker able to sniff traffic from the network can read, modify or corrupt the transported content. These protocols are not secure as they expose applications to an extensive range of risks:

- Sensitive data exposure
- Traffic redirected to a malicious endpoint
- Malware infected software update or installer
- Execution of client side code
- Corruption of critical information

Even in the context of isolated networks like offline environments or segmented cloud environments, the insider threat exists. Thus, attacks involving communications being sniffed or tampered with can still happen.

For example, attackers could successfully compromise prior security layers by:

- Bypassing isolation mechanisms
- Compromising a component of the network
- Getting the credentials of an internal IAM account (either from a service account or an actual person)

In such cases, encrypting communications would decrease the chances of attackers to successfully leak data or steal credentials from other network components. By layering various security practices (segmentation and encryption, for example), the application will follow the *defense-in-depth* principle.

Note that using the `http` protocol is being deprecated by major web browsers.

In the past, it has led to the following vulnerabilities:

- CVE-2019-6169
- CVE-2019-12327
- CVE-2019-11065

Ask Yourself Whether

- Application data needs to be protected against falsifications or leaks when transiting over the network.
- Application data transits over a network that is considered untrusted.
- Compliance rules require the service to encrypt data in transit.
- Your application renders web pages with a relaxed mixed content policy.
- OS level protections against clear-text traffic are deactivated.

There is a risk if you answered yes to any of those questions.

Recommended Secure Coding Practices

- Make application data transit over a secure, authenticated and encrypted protocol like TLS or SSH. Here are a few alternatives to the most common clear-text protocols:
  - Use`ssh` as an alternative to `telnet`
  - Use `sftp`, `scp` or `ftps` instead of `ftp`
  - Use `https` instead of `http`

Bug

Methods with "Pure" attribute should return a value

Bug

One-way "OperationContract" methods should have "void" return type

Bug

Optional parameters should be passed to "base" calls

Bug

Classes should not have only "private" constructors

- Use `SMTP` over `SSL/TLS` or `SMTP` with `STARTTLS` instead of clear-text SMTP
- Enable encryption of cloud components communications whenever it's possible.
- Configure your application to block mixed content when rendering web pages.
- If available, enforce OS level deativation of all clear-text traffic

It is recommended to secure all transport channels (even local network) as it can take a single non secure connection to compromise an entire application or system.

Sensitive Code Example

```
var urlHttp = "http://example.com";                 // Nonco
var urlFtp = "ftp://anonymous@example.com";         // Nonco
var urlTelnet = "telnet://anonymous@example.com";   // Nonco
```

```
using var smtp = new SmtpClient("host", 25); // Noncompliant
using var telnet = new MyTelnet.Client("host", port); // Non
```

Compliant Solution

```
var urlHttps = "https://example.com";
var urlSftp = "sftp://anonymous@example.com";
var urlSsh = "ssh://anonymous@example.com";
```

```
using var smtp = new SmtpClient("host", 25) { EnableSsl = tr
using var ssh = new MySsh.Client("host", port);
```

Exceptions

No issue is reported for the following cases because they are not considered sensitive:

- Insecure protocol scheme followed by loopback addresses like 127.0.0.1 or `localhost`

See

- OWASP Top 10 2021 Category A2 - Cryptographic Failures
- OWASP Top 10 2017 Category A3 - Sensitive Data Exposure
- Mobile AppSec Verification Standard - Network Communication Requirements
- OWASP Mobile Top 10 2016 Category M3 - Insecure Communication
- MITRE, CWE-200 - Exposure of Sensitive Information to an Unauthorized Actor
- MITRE, CWE-319 - Cleartext Transmission of Sensitive Information
- Google, Moving towards more secure web
- Mozilla, Deprecating non secure http

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