## Static Code Analysis with Puma Scan

A screenshot of a computer

AI-generated content may be incorrect.

Figure 1: Puma Scan Results on FullMetalLibrary.

The purpose of Static Code Analysis is to detect issues with the code security and quality. To run the scan, we used the Puma Scan 2022 extension for Visual Studio. Puma Scan checked the C# files for any syntax issues and rule violations.

**Scan Results:**

Use collection initializers or expressions (IDE0028):  
Elements are manually added to a collection instead of using an initializer or expression to do it. Using an initializer/expression would improve readability and performance.

Remove unused parameter (IDE0060):   
There was a method that included parameters that weren’t being used in it. This just adds needless complexity and can obfuscate the method’s purpose.

Namespace does not match folder structure (IDE0130):  
The file’s namespace doesn’t match its actual folder structure. This makes the code harder to navigate, and makes organization of code inconsistent.

Use ClassCleanupBehavior.EndOfClass with the [ClassCleanup] (MSTEST0034):   
There is no EndOfClass label at the end of the test class, which can make test cleanup unpredictable.

SYSLIB diagnostics for regex source generation:  
GeneratedRegexAttribute would generate/compile the regular expression implementation at build time rather than run time, improving performance and startup time.

**Interpretation of scan results:**   
None of the issues identified were a security vulnerability, and instead impact code quality and reliability. The most important one to fix in this case is the MSTEST0034 issue, which impacts testing reliability.

**Optimization plan:**To optimize the current program, we can do the following steps:  
-Update any collections to use initializers, to improve performance and readability.  
-Remove any parameters from methods that aren’t being used, to simplify the methods.  
-Fix the incorrect namespace to match the actual folder the .cs file is in.  
-Change the regex values to use GeneratedRegexAttribute, to improve performance and startup time.