



BAHIRDAR UNIVERSITY INSTITUTE OF TECHNOLOGY
FACULTY OF COMPUTING
SOFTWARE ENGINEERING DEPARTMENT
SOFTWARE METRICS
INDIVIDUAL ASSIGNMENT

Submitted to: Mr.Samuel

BY- Bethemariam Asrat

Section A

ID 1102834

April 2022

BDU

Table of Contents

1. Introduction.....	2
1.1. Document Overview.....	2
1.2. Abbreviation and Glossary.....	2
1.2.1. Abbreviation.....	2
1.2.2. Glossary.....	2
1.3. Project Description.....	3
2. Overview of static code analysis results.....	3
2.1. Overall Rating.....	3
2.2. Analysis Results.....	5
2.2.1. Vulnerabilities.....	5
2.2.2. Code Issues.....	7
2.2.3. Anti-patterns.....	12
2.2.4. Duplication.....	14
3. KPI Summary.....	18

1. Introduction

1.1 Document review

This document contains 3 projects namely python, online bookstore, and beehives. The static code analysis is done using embold. Embold is a critical component in the DevOps toolchain, that allows you to manage and monitor the quality of your software projects.

It detects structural issues and security leaks in your codebase early, so you can avoid technical debt and deliver high-quality software up to 4x faster.

1.2 Abbreviations and Glossary

1.2.1. Abbreviations

- ELOC – Executable Lines of Code
- KPI – Key Process Indicator
- Html-hypertext markup language

1.2.2. Glossary

Code issue- When a system is expected to behave in a certain way and it fails to meet the result, the issue occurs. Similarly, any defect or bug found in the code leads to code issues.

Vulnerability- The software vulnerability is an error or a weakness present in the software code. Those are product-related threats that can hamper your data and gain access to your products and data

Antipattern - an anti-pattern is a pattern that seems to work but is counter-productive and far from optimal in practice. An anti-pattern can easily result in unmaintainable and error-prone solutions.

Duplicated block- can be recognized by two blocks of code doing the same thing. It is a pure copy-paste or copy-paste-adaptation from one part of the code to another part of code. Besides that, the duplicated code may have the same set of reasons to change.

A rating system- is a numeric representation of the quality of software. The rating is calculated on every level of the software: for a function (or method), a component (or class), a package, and the overall

software. Embold rating ranges from -5 to 5, where -5 indicates poor-quality software whereas, 5 indicates an extremely good piece of software.

1.3 project description

Project name	Programming language used	ELOC	GitHub URL
python	Python, YAML and JSON	36.8K	https://github.com/Bethe-bethe/Python
Online bookstore	SQL, HTML, and java	1.3k	https://github.com/Bethe-bethe/onlinebookstore
Beehives	YAML and GO	15.9K	https://github.com/Bethe-bethe/beehive-1

2. Overview of Static Code Analysis Results

2.1 overall rating

Project one- python


OVERALL RATING

3.36

The overall rating of 3.36 is good. consider improving the rating by fixing some issues.

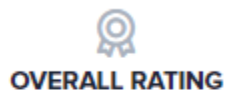
Project two- online bookstore



3.13

The overall rating of 3.13 is good.

Project three- beehives



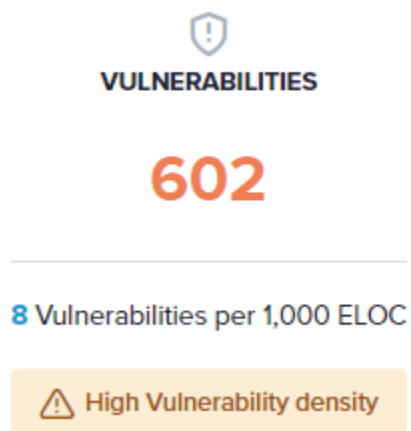
3.8

The overall rating is good.

2.2 Analysis result

2.2.1 vulnerability

Project one-python



issues	criticality	KPI	language
B101-blacklist_calls	high	Functionality and robustness	python
B311-blacklist_calls	high	security	python
B605-start_process-with_a_shell	high	Security and robustness	python
DUO107-BadXMLUUseLinter	high	security	python
B105-hardcore_password_string	medium	Conceptual integrity and security	python
B301-blacklist_calls	medium	security	python
DUO102-BadRandomGeneratorUseLinter	medium	Robustness and security	python
DUO104-BadEvaUseLinter	medium	Robustness and security	python
DUO130-BadHashlibUseLinter	medium	Security and usability	python

Project two- online bookstore



issues	criticality	KPI	language
Error Message Containing Sensitive Data	high	security	java
Resource Leak	critical	Security and efficiency	java
Avoid Catching Generic Exception	medium	analyzability	java

Project three – beehive



issues	criticality	KPI	language
G101-LookForHardCodedCredentials	critical	security	GO
G402-LookForBadTLSConnectionSettings	critical	security	GO
G104-AuditErrorsNotChecked	high	security	GO
G107-UrlProvidedToHTTPRequestAsTaintInput	medium	security	GO

G301-PoorFilePermissionsUsedWhenCreatingAdirectory	medium	security	GO
G304-FilePathprovidedastaintinput	medium	security	GO
G306-PoorFilePermissionsUsedWhenWritingToAnewFile	medium	security	GO
G307-DeferringaMethodWhichReturnsAnError	medium	security	GO
G601-ImplicitMemoryAliasingOfItemsFromARangeStatement	medium	security	GO
G203-UseOfUnescapedDataInHTMLTemplates	low	security	GO

2.2.2 code issues

Project one – python



issues	criticality	KPI	language
B403-blacklist_calls	high	security	python
E1102-objectNotCallable	high	robustness	python
E1131-unsupportedBinaryOperation	high	maintainability	python
E1136-valueUnsubscriptable	high	maintainability	python
E0611-noNameInModule	medium	functionality	python
E1101-accessOfNonExistentMember	medium	robustness	python
R0201-methodCouldBeFunction	medium	functionality	python
R1714-consider-using-in	medium	Robustness	python
R1716-chained-comparison	medium	maintainability	python
R1720-no-else-raise	medium	maintainability	python
W0108-lambdaMayNotBeNecessary	medium	maintainability	python

W0201-attributeDefinedOutsideInit	medium	robustness	python
W0212-invalidAccessToProtectedMember	medium	functionality	python
W0602-noAssignmentOfGlobalVar	medium	robustness	python
W0602-unusedVariable	medium	maintainability	python
W0703-catchingTooGeneralException	medium	functionality	python
C0113-unneededNegation	low	usability	python
C0114-missing-module-docstring	low	maintainability	python
E0001-syntaxErrorForModule	low	usability	python
R0902-tooManyInstanceAttributes	low	maintainability	python
R0903-tooFewPublicMethods	low	maintainability	python
R0912-tooManyBranches	low	maintainability	python
R0913-tooManyArguments	low	maintainability	python
R0914-tooManyLocalVariables	low	maintainability	python
R0915-tooManyStatements	low	maintainability	python
R1704-localNamesRedefinedArg	low	usability	python
R1705-unneccessaryElseAfterReturn	low	usability	python
R1711-uselessReturn	low	maintainability	python
R1721-unnecessary-comprehension	low	maintainability	python
R1731-consider-using-max-builtin	low	Conceptual integrity and maintainability	python
R1735-use-dict-literal	low	efficiency	python
W0105-stringStatementHasNotEffect	low	usability	python
W0613-unusedArgument	low	usability	python
W0614-unusedImportFromWildcardImport	low	usability	python
W0621-nameRedefinedFromOuterScope	low	usability	python
W1514-unspecified-encoding	low	Maintainability and portability	python
C0200-useEnumerateInsteadOfRange	info	usability	python
C0206-consider-using-dict-items	info	Conceptual integrity	python
C0209-consider-using-f-string	info	Conceptual integrity	python
R1726-simplified-condition	info	Conceptual integrity	python

Project two- online bookstore

{x}

CODE ISSUES

68

47 Code issues per 1,000 ELOC

⚠ Critically High Code issue density

issues	criticality	KPI	language
Doctype-first	high	functionality	html
Empty catch Block	high	analyzability	java
Multi-valued Attribute	high	efficiency	SQL
Public Static Field should Be Final	high	security	java
Use of Sysout	high	analyzability	java
Avoid Catching NPE	medium	robustness	java
AvoidLiteralsInIfCondition	medium	usability	java
ClassWithOnlyPrivateConstructorShouldBeFinal	medium	maintainability	java
Imprecise Data Type	medium	efficiency	SQL
LiteralsFirstInComparisons	medium	Robustness	java
Tag-pair	medium	functionality	html
UnneccessaryModifier	medium	maintainability	java
UnusedlocalVariable	medium	usability	java
Readable Passwords	low	Efficiency	SQL
NULL Usage	info	efficiency	SQL
UnnecessaryImport	info	maintainability	java

Project three-beehives

{x}

CODE ISSUES

151

7 Code issues per 1,000 ELOC

⚠ High Code issue density

<u>issues</u>	<u>criticality</u>	<u>KPIs</u>	<u>languages</u>
S1023-Omit redundant control flow	<u>high</u>	<u>functionality</u>	<u>GO</u>
G204-AuditUseOfCommandExecution	<u>medium</u>	<u>security</u>	<u>GO</u>
gocyclo-cyclomaticComplexity	<u>medium</u>	<u>efficiency</u>	<u>GO</u>
golint-packageNameStutters	<u>medium</u>	<u>usability</u>	<u>GO</u>
golint-receiverNameShouldBeConsistent	<u>medium</u>	<u>robustness</u>	<u>GO</u>
gotype-unusedVar	<u>medium</u>	<u>maintainability</u>	<u>GO</u>
S1000-Use plain channel send or receive	<u>medium</u>	<u>functionality</u>	<u>GO</u>
S1007-Simplify regular expression	<u>medium</u>	<u>Functionality and maintainability</u>	<u>GO</u>
S1011-Use a single append to concatenate two slices	<u>medium</u>	<u>Functionality and efficiency</u>	<u>GO</u>

S1017-Replace manual trimming with strings.TrimPrefix	<u>medium</u>	<u>functionality</u>	<u>GO</u>
S1024-Use time.Until	<u>medium</u>	<u>functionality</u>	<u>GO</u>
S1037-Elaborate way of sleeping	<u>medium</u>	<u>functionality</u>	<u>GO</u>
SA1016-Trapping a signal that cannot be trapped	<u>medium</u>	<u>functionality</u>	<u>GO</u>
SA1019-Deprecated function or variable or constant or field	<u>medium</u>	<u>maintainability</u>	<u>GO</u>
SA4004-The loop exits unconditionally	<u>medium</u>	<u>functionality</u>	<u>GO</u>
SA4006-A variable is never read before being overwritten	<u>Medium</u>	<u>Conceptual Integrity</u>	<u>GO</u>
vet-unreachableCode	<u>medium</u>	<u>robustness</u>	<u>GO</u>
S1002-Omit comparison with boolean constant	<u>low</u>	<u>functionality</u>	<u>GO</u>
S1005-Drop unnecessary use of the blank identifier	<u>low</u>	<u>functionality</u>	<u>GO</u>
SA4017-A return value of pure function is discarded	<u>low</u>	<u>functionality</u>	<u>GO</u>
SA9003-Empty if-else body	<u>low</u>	<u>maintainability</u>	<u>GO</u>
ST1005-Incorrectly formatted error string	<u>low</u>	<u>Maintainability and robustness</u>	
U1000-Unused function	<u>low</u>	<u>maintainability</u>	<u>GO</u>
U1000-Unused function	<u>low</u>	<u>functionality</u>	<u>GO</u>
vet-structtags	<u>low</u>	<u>functionality</u>	<u>GO</u>

2.2.3 Antipatterns

project one – python



28

Less than 1 Anti-pattern per 1,000 ELOC

 Very Low Anti-pattern density

issues	criticality	KPI	language
FatInterface	medium	usability	python
FeatureEnvy	medium	maintainability	python

Project two- online bookstore



5

3 Anti-patterns per 1,000 ELOC

 Very Low Anti-pattern density

issues	criticality	KPI	language
FeatureEnvy	medium	maintainability	java

Project three-beehives



There is no antipattern.

2.2.4 Duplication

Project one-python



DUPLICATION BLOCKS

31

Less than 1 Duplicate Line per 1,000 ELOC

 Very Low Duplication density

occurrence	files	Issue type	language	Duplicated code	Duplicated map
2	1	Clone block	python	109 lines of code	2 occurrences in 1 file
2	1	Clone block	python	70 lines of code	2 occurrences in 1 file
2	1	Clone block	python	10 lines of code	2 occurrences in 1 file
2	2	Clone block	python	14 lines of code	2 occurrences in 2 files
2	2	Clone block	python	22 lines of code	2 occurrences in 2 files
4	1	Clone block	python	23 lines of code	4 occurrences in 1 file
2	2	Clone block	python	22 lines of code	2 occurrences in 2 files

2	2	Clone block	python	22 lines of code	2 occurrences in 2 files
2	2	Clone block	python	28 lines of code	2 occurrences In 2 files
2	2	Clone block	python	13 lines of code	2 occurrences in 2 files
2	1	Clone block	python	14 lines of code	2 occurrences in 1 file
2	2	Clone block	python	13 lines of code	2 occurrences in 2 files

Project two- online bookstore



DUPLICATION BLOCKS

13

9 Duplicate Lines per 1,000 ELOC

 High Duplication density

occurrence	files	Issue type	language	Duplicated code	Duplicated map
------------	-------	------------	----------	-----------------	----------------

8	8	Clone block	html	33 lines of code	8 occurrences in 8 files
7	7	Clone block	html	72 lines of code	7 occurrences in 7 files
6	6	Clone block	html	80 lines of code	6 occurrences in 6 files
2	2	Clone block	html	97 lines of code	2 occurrences in 2 files
2	2	Clone block	html	95 lines of code	2 occurrences in 2files

Project three- beehives



16

Less than 1 Duplicate Line per 1,000 ELOC

 Very Low Duplication density

occurrence	files	Issue type	language	Duplicated code	Duplicated map
2	1	Clone block	GO	37 lines of code	2 occurrences in 1 file

2	2	Clone block	GO	42 lines of code	2 occurrences in 2 files
2	2	Clone block	GO	39 lines of code	2 occurrences in 2 files
2	1	Clone block	GO	32 lines of code	2 occurrences in 1 file
2	1	Clone block	GO	30 lines of code	2 occurrences in 1 file
2	2	Clone block	GO	23 lines of code	2 occurrences in 2 files
4	1	Clone block	GO	32 lines of code	4 occurrences in 1 file
2	2	Clone block	GO	24 lines of code	2 occurrences in 2 files
2	1	Clone block	GO	24 lines of code	2 occurrences in 1 file
5	1	Clone block	GO	29 lines of code	5 occurrences in 1 file
2	1	Clone block	GO	27 lines of code	2 occurrences in 1 file
3	1	Clone block	GO	22 lines of code	3 occurrences in 1 file
2	2	Clone block	GO	19 lines of code	2 occurrences in 2 files
2	1	Clone block	GO	22 lines of code	2 occurrences in 1 file
2	2	Clone block	GO	14 lines of code	2 occurrences in 2 files
2	2	Clone block	GO	16 lines of code	2 occurrences in 2 files

3. KPI summary

KPI summary	Project one	Project two	Project three
analyzing	<p>your score of Analyzability 99 is very good. Many anti-patterns, code issues, vulnerabilities, and duplication can affect Analyzability.</p> <p>There are 8 issues affecting this KPI</p>	<p>Your score of Analyzability 5 low</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Analyzability</p> <p>There are 12 issues affecting this KPI</p>	<p>Your score of Analyzability 100 very good</p> <p>Many anti-patterns, code issues, vulnerabilities and duplication can affect Analyzability</p>
Conceptual integrity	<p>Your score on Conceptual Integrity is 89 good. Many anti-patterns, code issues, vulnerabilities, and duplication can affect Conceptual Integrity</p> <p>There are 103 issues affecting this KPI</p>	<p>Your score on Conceptual Integrity is 100 very good</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Conceptual Integrity</p>	<p>Your score of Conceptual Integrity 98 is very good</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Conceptual Integrity</p> <p>There are 6 issues affecting this KPI</p>
efficiency	<p>your score of Efficiency 98 is very good. Many anti-patterns, code issues, vulnerabilities, and duplication can affect Efficiency. There are 21 issues affecting this KPI</p>	<p>Your score of Efficiency 75 is good.</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Efficiency</p> <p>There are 6 issues affecting this KPI</p>	<p>Your score of Efficiency 95 very good</p> <p>Many anti-patterns, code issues, vulnerabilities and duplication can affect Efficiency</p> <p>There are 21 issues affecting this KPI</p>

functionality	<p>Your score of Functionality 1 is low.</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Functionality.</p> <p>There are 515 issues affecting this KPI.</p>	<p>Your score of Functionality 50 is acceptable. Many anti-patterns, code issues, vulnerabilities, and duplication can affect Functionality.</p> <p>There are 10 issues affecting this KPI.</p>	<p>Your score of Functionality 91 very good</p> <p>Many anti-patterns, code issues, vulnerabilities and duplication can affect Functionality</p> <p>There are 38 issues affecting this KPI</p>
maintainability	<p>Your score of Maintainability 1 low</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Maintainability</p> <p>There are 1583 issues affecting this KPI</p>	<p>your score of Maintainability 1 is low.</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Maintainability</p> <p>There are 33 issues affecting this KPI</p>	<p>Your score of Maintainability 92 very good</p> <p>Many anti-patterns, code issues, vulnerabilities and duplication can affect Maintainability</p> <p>There are 33 issues affecting this KPI</p>
portability	<p>Your score of Portability 95 is very good</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Portability</p> <p>There are 43 issues affecting this KPI</p>	<p>Your score of Portability 100 is very good</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Portability.</p>	<p>Your score of Portability 100 very good</p> <p>Many anti-patterns, code issues, vulnerabilities and duplication can affect Portability</p>
reliability	<p>your score of Reliability 100 is very good</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Reliability</p>	<p>Your score of Reliability 100 is very good</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Reliability</p>	<p>Your score of Reliability 100 very good</p> <p>Many anti-patterns, code issues, vulnerabilities and duplication can affect Reliability</p>

robustness	<p>Your score of Robustness 1 low</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Robustness</p> <p>There are 634 issues affecting this KPI</p>	<p>Your score of Robustness 94 is very good</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Robustness</p> <p>There are 2 issues affecting this KPI</p>	<p>Your score of Robustness 95 very good</p> <p>Many anti-patterns, code issues, vulnerabilities and duplication can affect Robustness</p> <p>There are 19 issues affecting this KPI</p>
security	<p>Your score of Security 1 low</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect the Security</p> <p>There are 610 issues affecting this KPI</p>	<p>Your score of Security 1 low</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Security.</p> <p>There are 18 issues affecting this KPI.</p>	<p>Your score of Security 84 good</p> <p>Many anti-patterns, code issues, vulnerabilities and duplication can affect Security</p> <p>There are 24 issues affecting this KPI</p>
usability	<p>Your score of Usability 1 low</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Usability</p> <p>There are 1056 issues affecting this KPI</p>	<p>Your score of Usability 86 is good</p> <p>Many anti-patterns, code issues, vulnerabilities, and duplication can affect Usability</p> <p>There are 5 issues affecting this KPI.</p>	<p>Your score of Usability 87 good</p> <p>Many anti-patterns, code issues, vulnerabilities and duplication can affect Usability</p> <p>There are 57 issues affecting this KPI</p>