Azure DevOps

Tooling and Code Analysis

.NET CORE

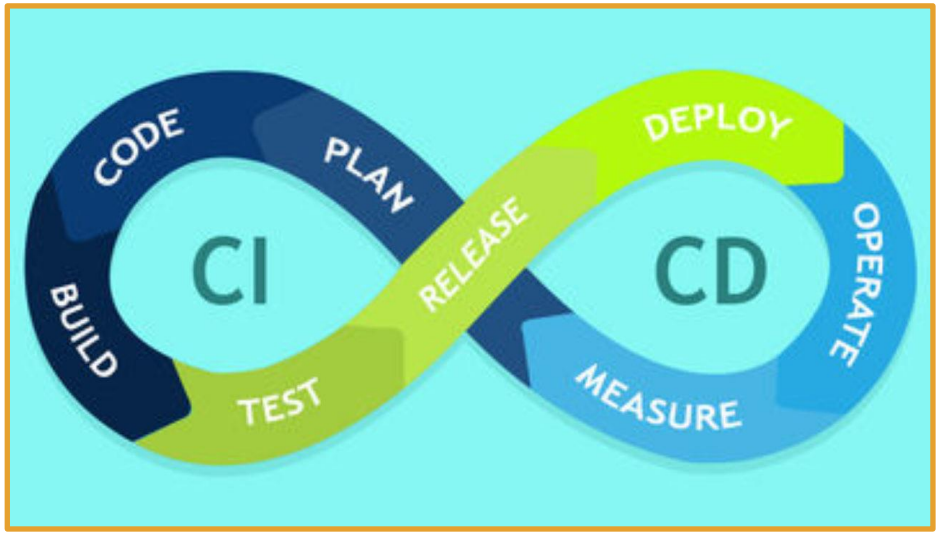
DevOps technologies, combined with people and processes, enable teams to implement CI/CD and continually provide value to customers.

HTTPS://AZURE.MICROSOFT.COM/EN-US/SOLUTIONS/DEVOPS/

CI/CD and Continuous Testing (CT)

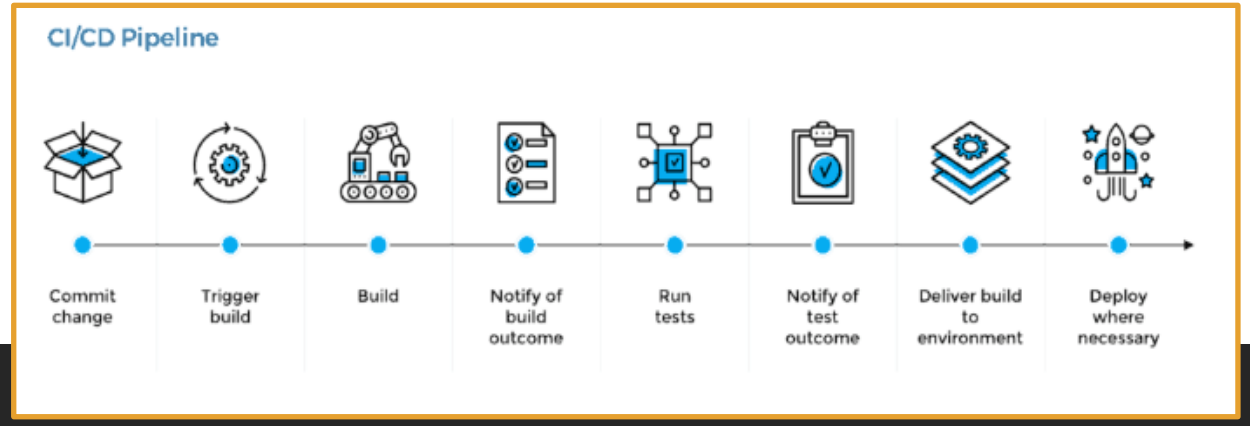
https://docs.microsoft.com/en-us/azure/devops/pipelines/overview?view=azure-devops-2019

Continuous Integration (CI) is the practice of automating the merging and testing of code. Implementing ***CI*** helps catch bugs early, which makes them less expensive to fix. Automated tests execute as part of the CI process.



Continuous Delivery (CD) is a process by which code is built, tested, and deployed to one or more test and production environments to help improve product quality.

Continuous Testing (CT) is the use of automated build-deploy-test workflows that test your changes continuously in a fast, scalable manner.



Azure DevOps - Introduction

https://docs.microsoft.com/en-us/azure/devops/pipelines/ecosystems/dotnet-core?view=azure-devops
https://docs.microsoft.com/en-us/azure/devops/pipelines/get-started/pipelines-get-started?view=azure-devops
https://docs.microsoft.com/en-us/azure/devops/pipelines/?view=azure-devops

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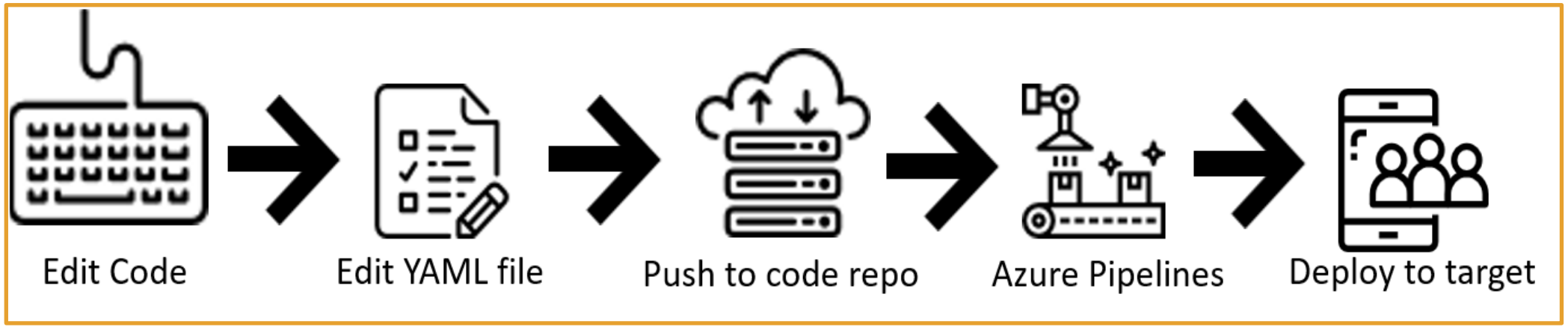
Azure Pipelines is a cloud service that you can use to automatically build and test your code and make it available to other users. ***Azure Pipelines*** works with many language or project types.

Azure Pipelines combines ***Continuous Integration (CI)*** and ***Continuous Delivery (CD)*** to constantly and consistently test and build your code to be shipped to any target.

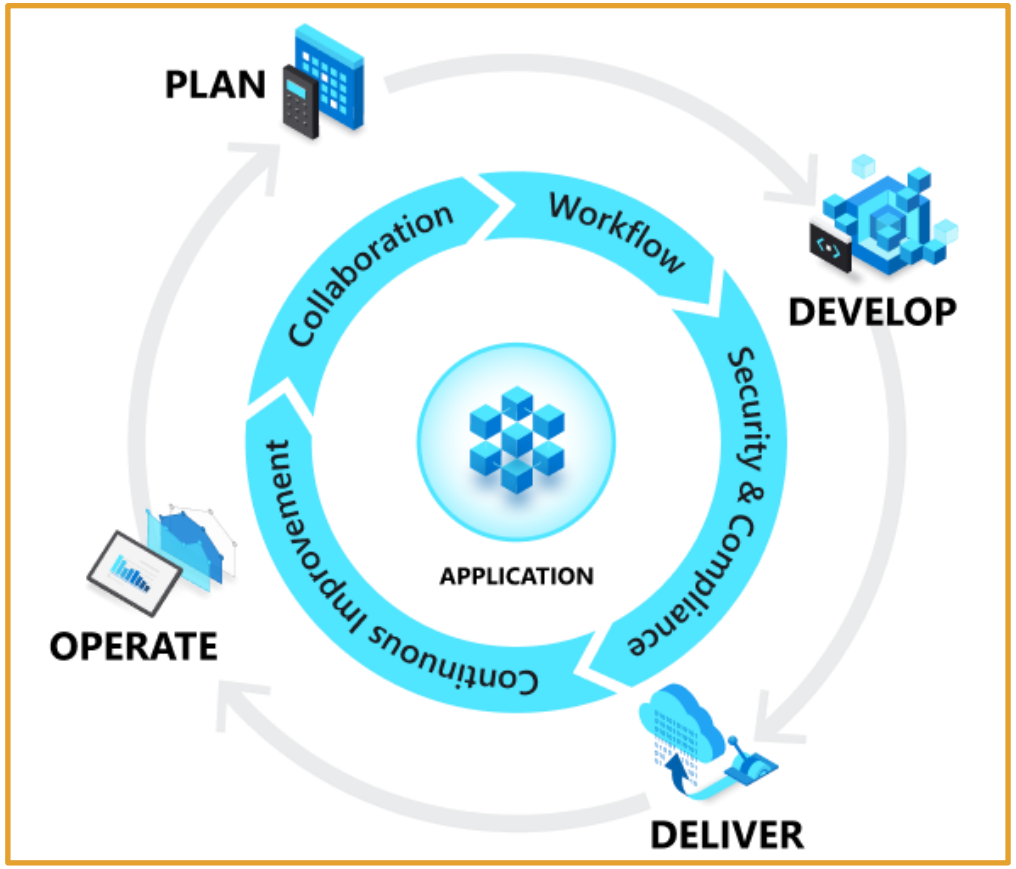


Build Definition

https://docs.microsoft.com/en-us/aspnet/web-forms/overview/deployment/configuring-team-foundation-server-for-web-deployment/creating-a-build-definition-that-supports-deployment#task-overview

A ***build definition*** is the mechanism that controls how and when builds occur. ***Azure DevOps*** uses a .yaml file to define a build. Each build definition specifies:

- The things you want to build.
- The criteria that determine when a build should take place
- The location to which the Build should send build outputs.
- The amount of time that each build should be retained.
- Various other parameters of the build process.

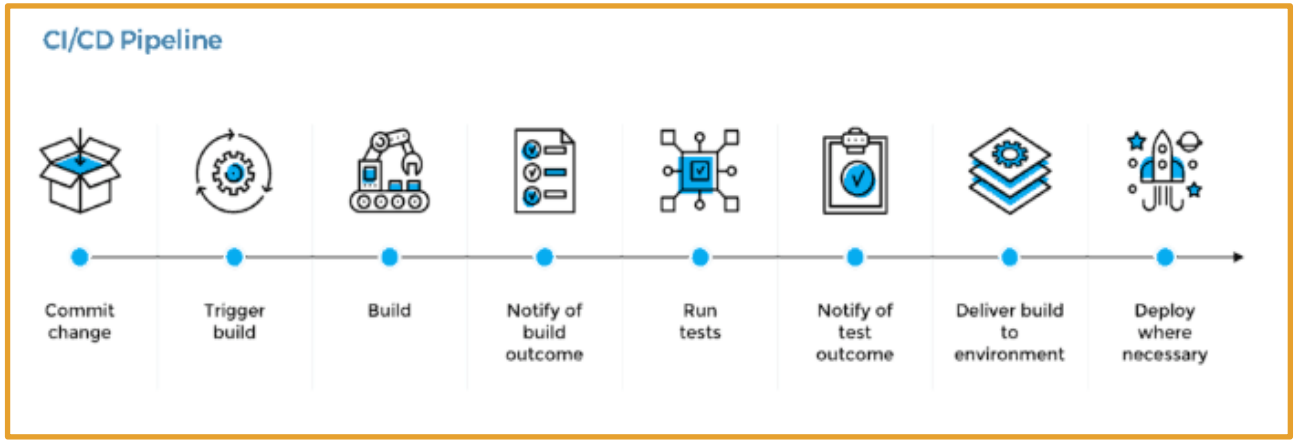


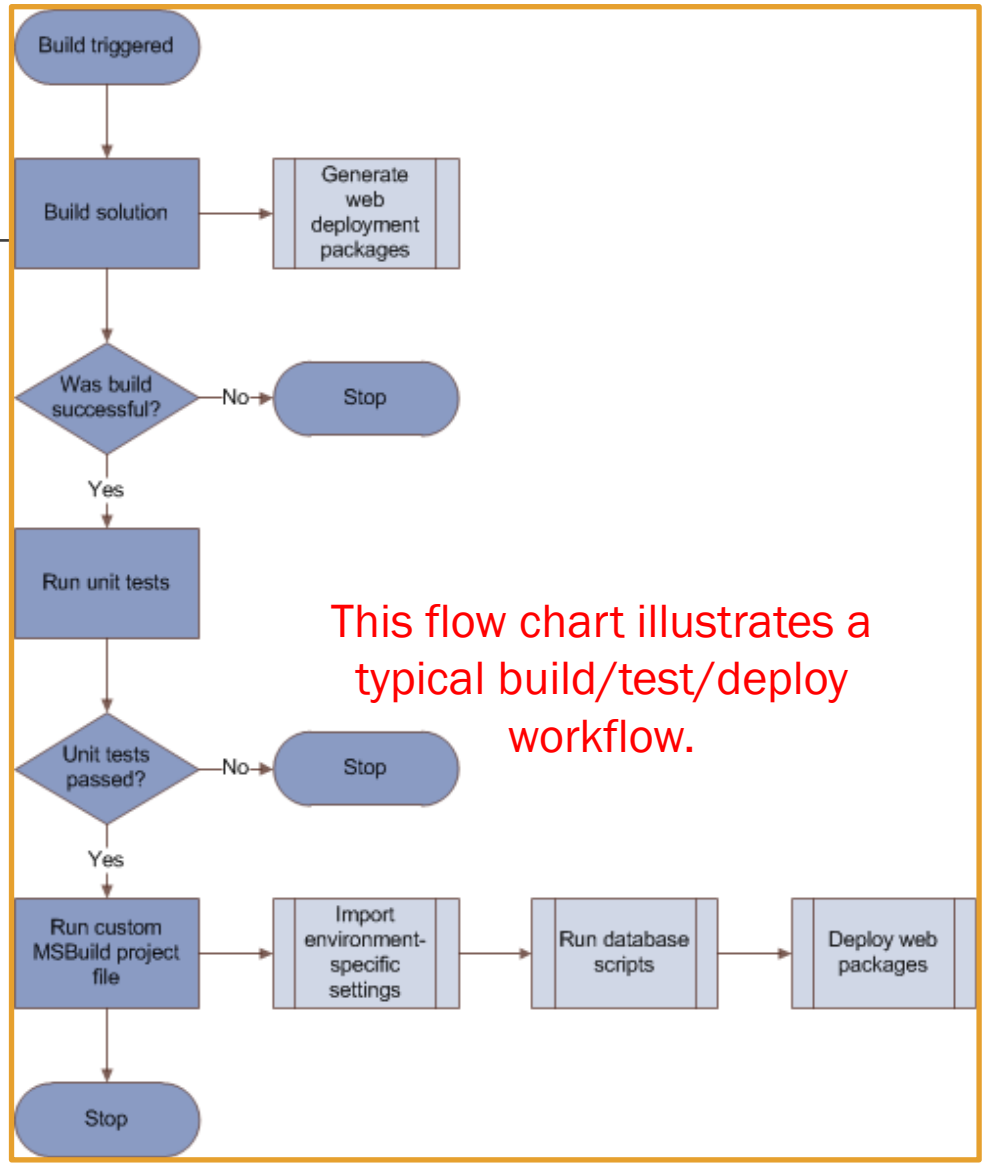
Release Pipeline

https://docs.microsoft.com/en-us/azure/devops/pipelines/release/?view=azure-devops

Release pipelines in ***Azure Pipelines*** help your team continuously deliver software to your clients faster and with lower risk.

You can fully automate the testing, delivery, and analysis of your software all the way to production or set up semi-automated processes with required approvals and on-demand deployments.





This flow chart illustrates a typical build/test/deploy workflow.

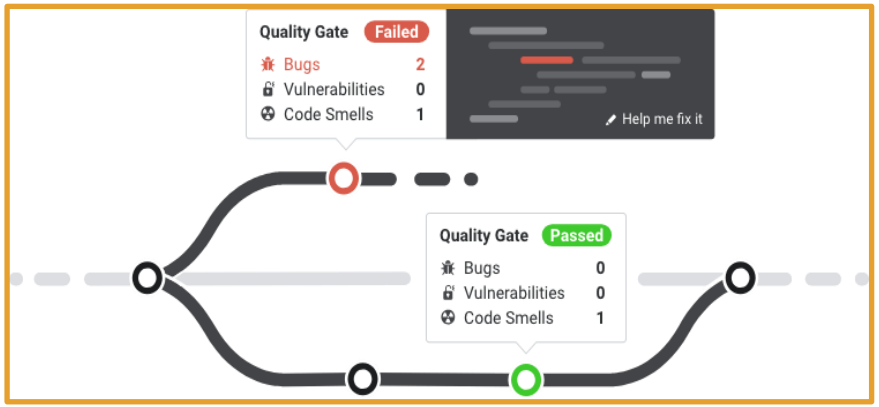
What is Static Code Analysis?

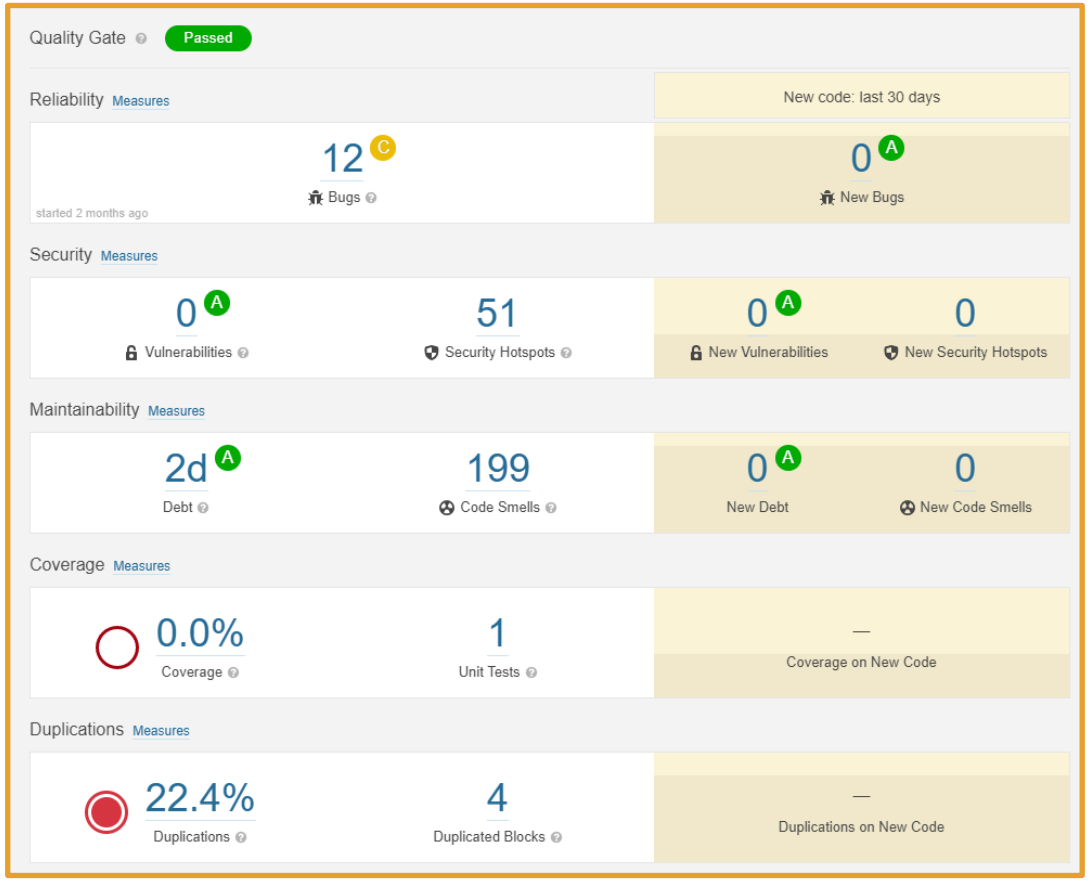
https://en.wikipedia.org/wiki/Static_program_analysis

Static code analysis is the analysis of computer software performed without executing the program. ***Static code analysis*** is usually performed on the source code.

The term is usually applied to the analysis performed by an automated tool. SonarCloud and SonarQube are popular Static code analysis tools.

Human analysis is called code review.





What is a Coverage Review?

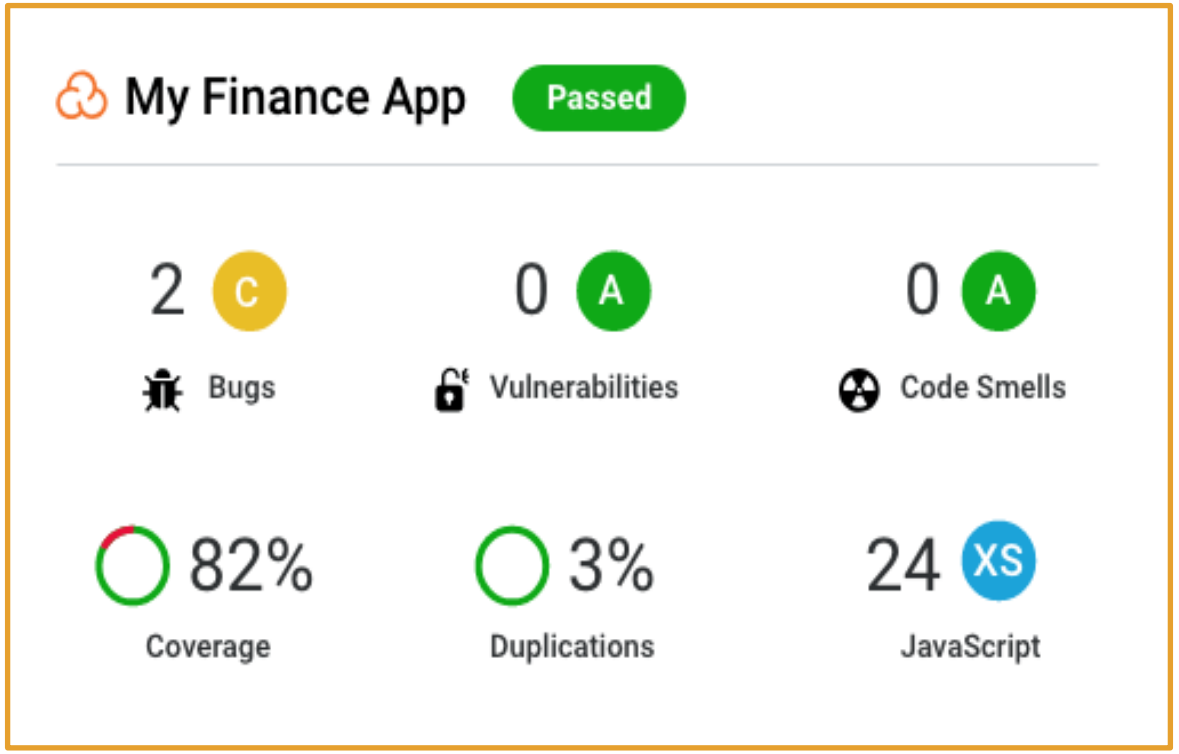
https://sonarcloud.io/documentation/user-guide/metric-definitions/
https://sonarcloud.io/documentation/user-guide/concepts/

How much of the source code has been covered by the unit tests?

Code Coverage is determined by evaluating what percentage of the total lines of code are covered by unit testing. It is a mix of Line coverage and Condition coverage.

Coverage = (CT + CF + LC) / (2*B + EL)

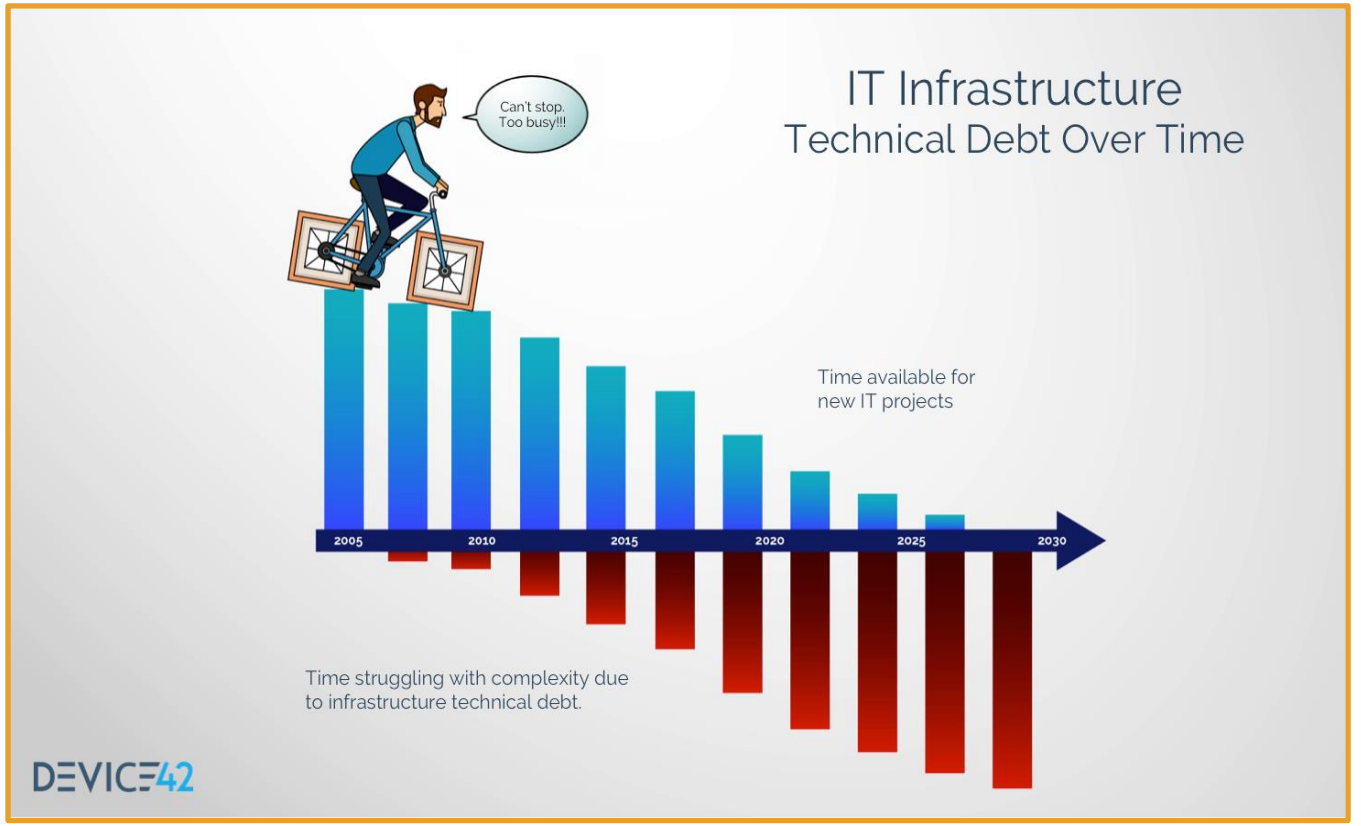
- CT = conditions that have been evaluated to 'true' at least once
- CF = conditions that have been evaluated to 'false' at least once
- LC = covered lines = lines_to_cover - uncovered_lines
- B = total number of conditions
- EL = total number of executable lines (lines_to_cover)



Technical Debt

https://sonarcloud.io/documentation/user-guide/concepts/

Technical Debt is the estimated time required to fix all Maintainability Issues/code smells.

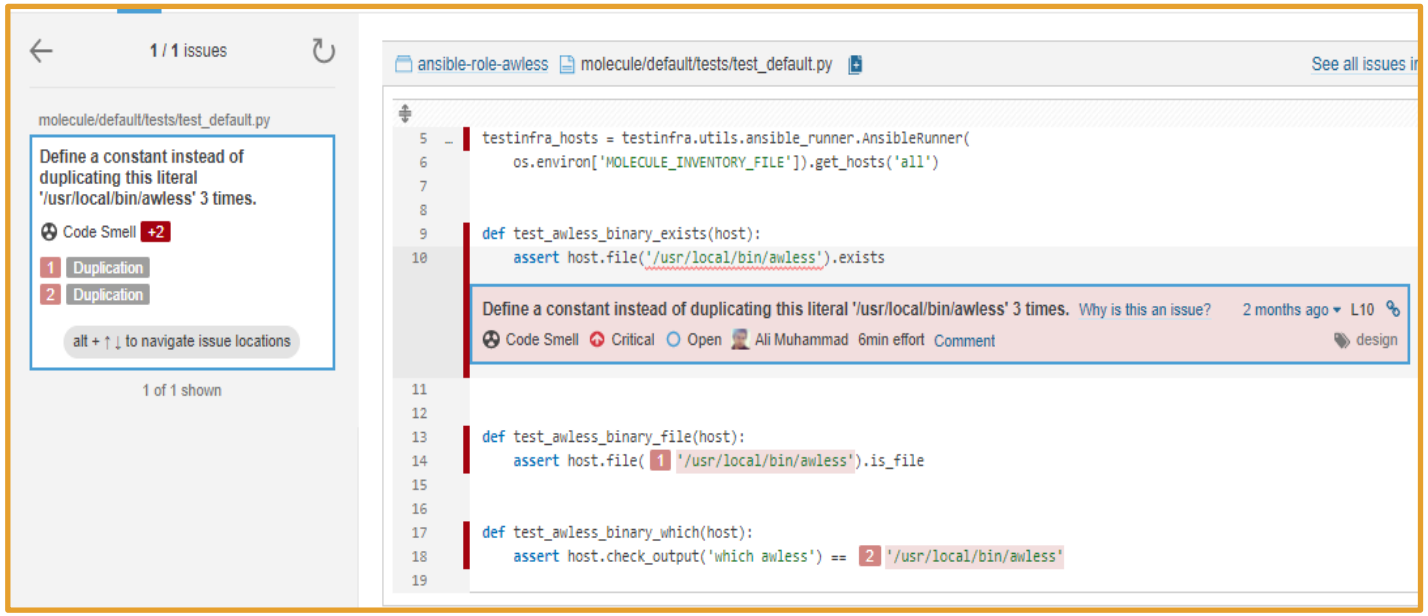


What is a Code Smell?

https://sonarcloud.io/documentation/user-guide/concepts/
https://sonarcloud.io/project/issues?id=ansible-role-awless&open=AXEseUF1IRsecPgXK050&resolved=false&types=CODE_SMELL

A ***Code Smell*** is any characteristic in the source code of a program that possibly indicates a deeper problem. Determining what is and is not a ***Code Smell*** is subjective, and varies by language, developer, and development methodology.

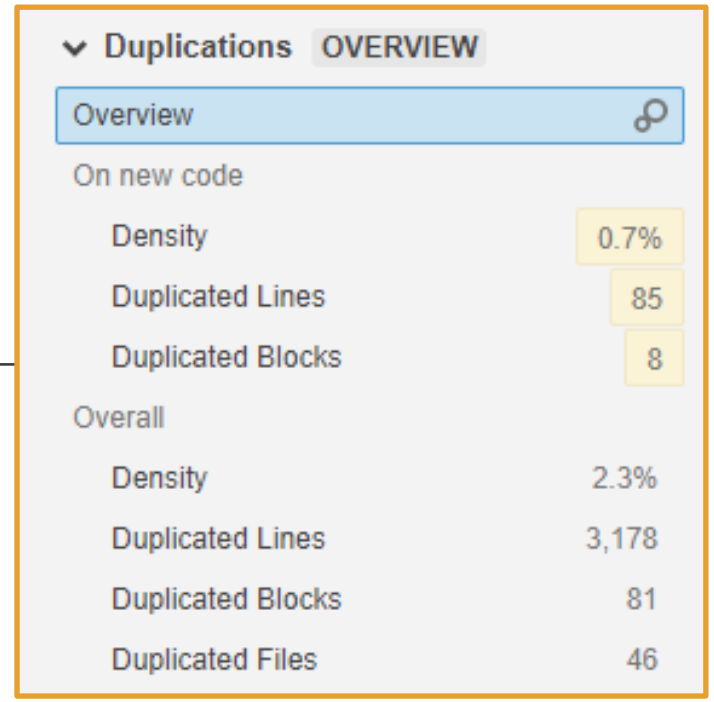
A ***Code Smell*** is an issue with long-term maintainability in the code. Leaving it as-is means that maintainers will have a harder time than they should making changes to the code. They'll risk introducing new errors as they make changes.

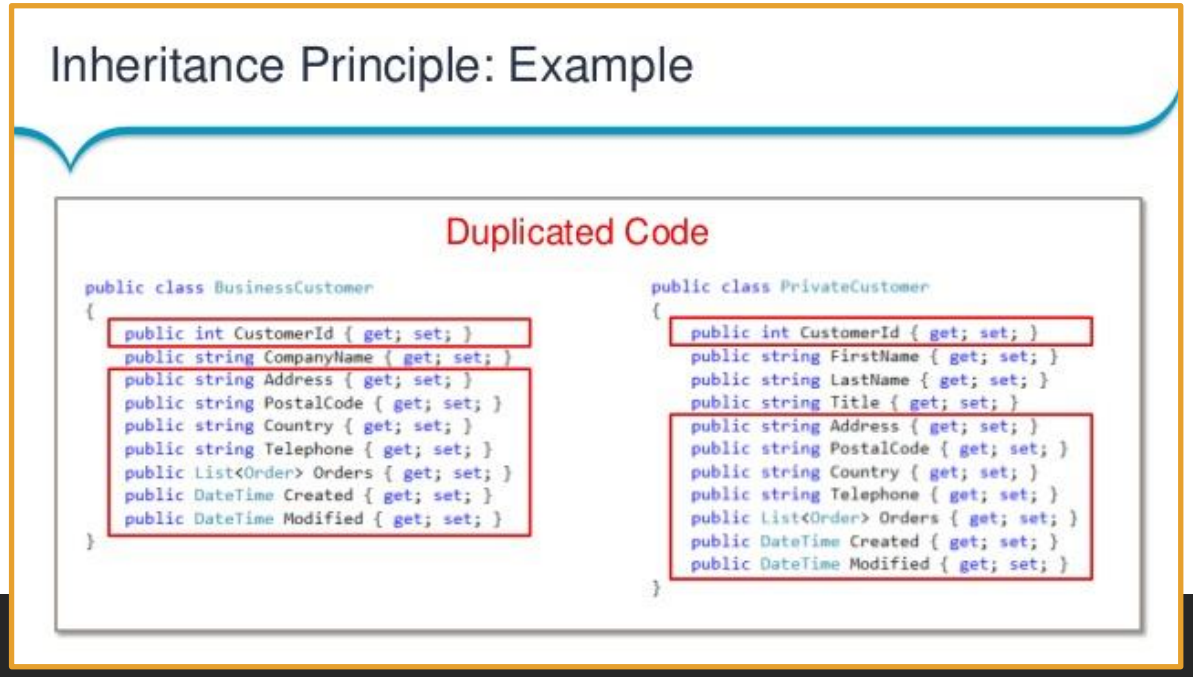


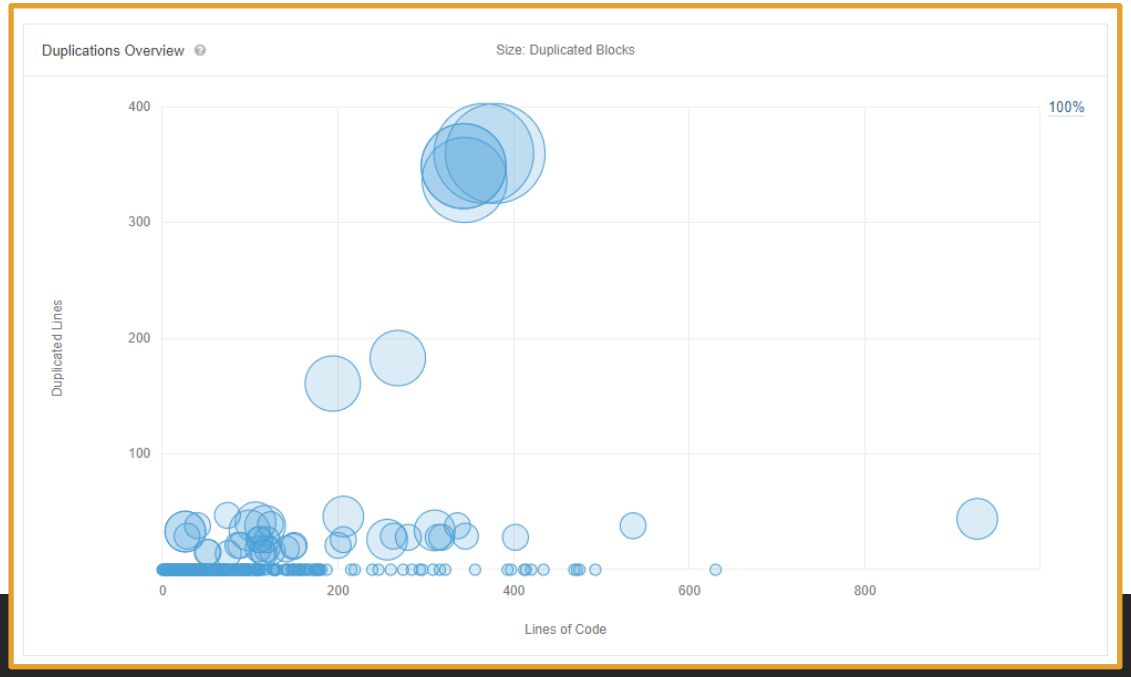
Duplication

https://sonarcloud.io/component_measures?id=microsoft_vscode-python&metric=Duplications

Duplication in code analysis indicates lines of code that are identical and could theoretically be separated into a method to be called or resolved using SOLID or DRY principles.







Quality Gate

https://sonarcloud.io/documentation/user-guide/quality-gates/

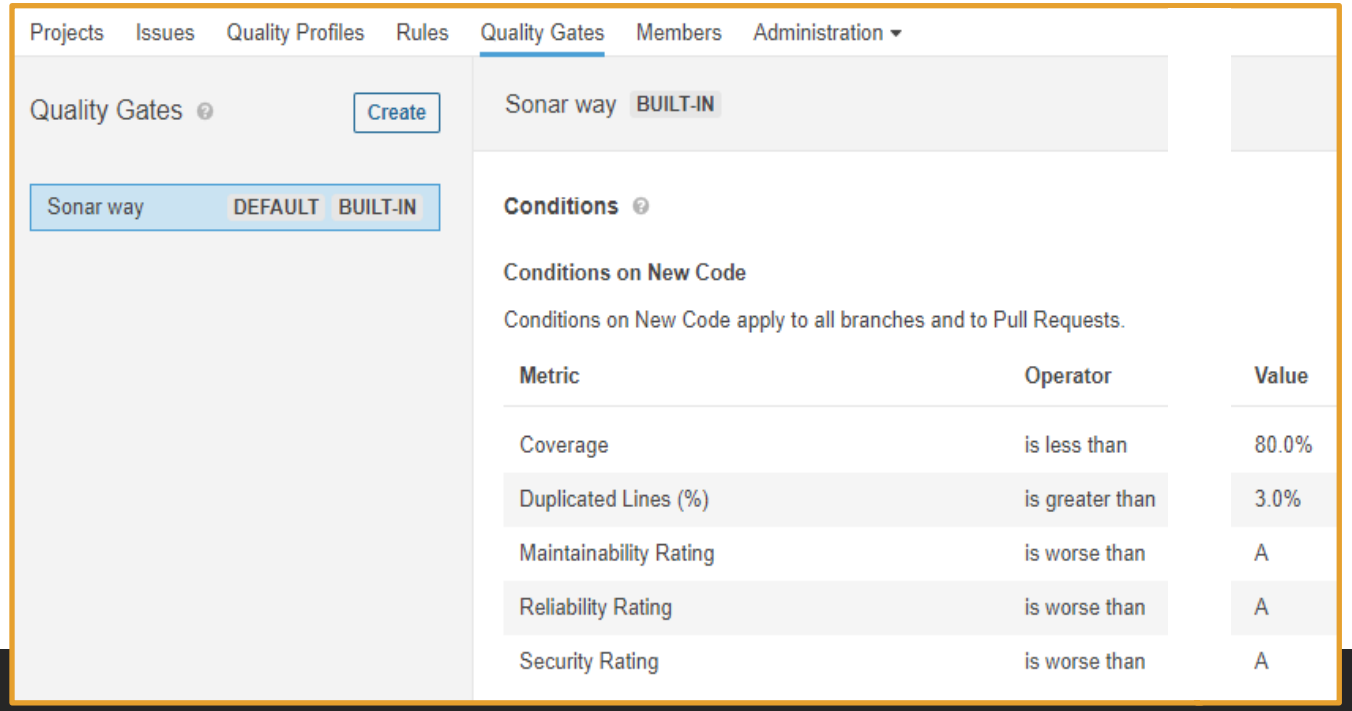
A ***quality gate*** is the best way to Fix the Water Leak and enforce policies ensuring high quality code in your organization.

You can define as many quality gates as you wish. SonarCloud, by default, provides a built-in Quality Gate that is recommended for most projects. You can receive a notification when the Quality Gate fails.

Define a set of Boolean conditions based on measure thresholds. Projects are then measured against them.

For example:

- No new blocker issues
- Code coverage on new code greater than 80%



Monitoring Security and Vulnerability

https://sonarcloud.io/documentation/user-guide/concepts/
https://sonarcloud.io/documentation/user-guide/metric-definitions/#security

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Security-related issues represent somewhere in your code attackers could exploit.

Security hotspots are areas of the code that may cause security issues and therefore need to be reviewed.

The SonarCloud Quality Model has three different types of rules: Reliability (bug), Vulnerability (security), and Maintainability (code smell) rules.

The idea is that one of these rules will flag anything suspicious. Then a security auditor can manually review the report, delete the false positives, and send the appropriate issues for remediation.