Deloitte.

Current Cloud Migration Approaches

Cloud is maturing and enterprises are looking to **migrate large-scale applications to the cloud** in order to increase agility and elasticity, reduce IT spend, and increase uptime.

Code that is Native

Designed from scratch to maximize design for scalability, portability, performance but requires app rewrite

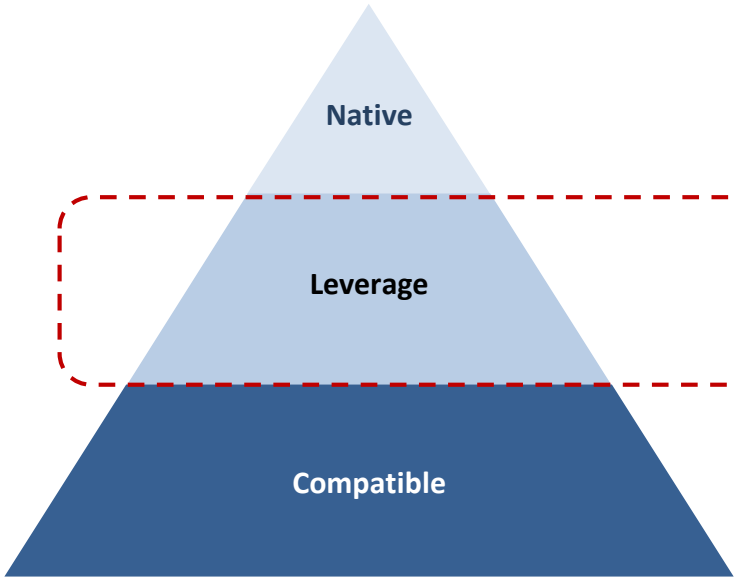
Code that is Compatible

The application gains infrastructure value of the cloud but does not generate maximum value possible

The standard approaches towards application migration to the cloud have become either to rewrite a cloud native application from scratch or to transfer existing application assets to a compatible cloud service

Leverage Cloud Native Designs

Missing between the cloud native and cloud compatible approaches, is an approach that can leverage cloud native designs into existing software assets



Code that is Native is designed from scratch to maximize design for scalability, portability, performance but requires app rewrite

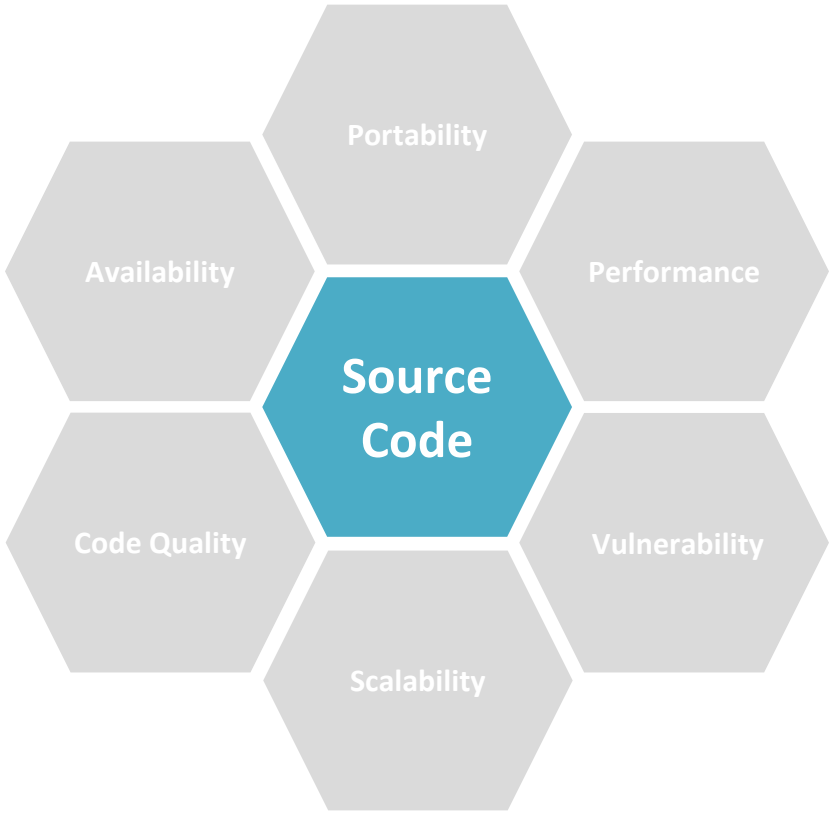
Code that Leverages attributes of the Cloud can maximize existing software investments and exploit Cloud designs

Code that is Compatible with the Cloud gains infrastructure value but does not generate maximum value possible from Cloud

However, applications are still faced with the daunting task of measuring the cloud readiness of their application and understanding the level of effort needed to retrofit the application to leverage cloud native designs

Cloud Native Anti-Patterns

Building on experience from working on complex cloud implementation projects and industry research, the Deloitte Application Architecture team has identified a list of cloud native code anti-patterns* across six key categories

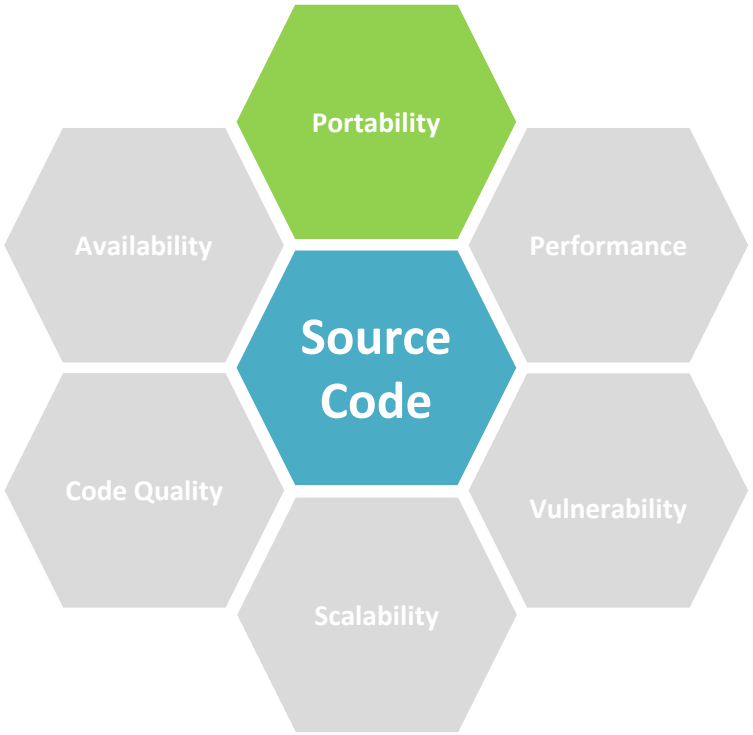


Our ruleset is standardized to the code anti-patterns advocated by Heroku's Twelve-Factor App methodology and extends it to additional cloud native categories

* We define cloud native anti-patterns as common code characteristics that hinder the ability of the application to maximize on cloud benefits

Cloud Native Portability Anti-Patterns

6 Key Metrics



Portability

Ability to seamlessly port application from one platform to another

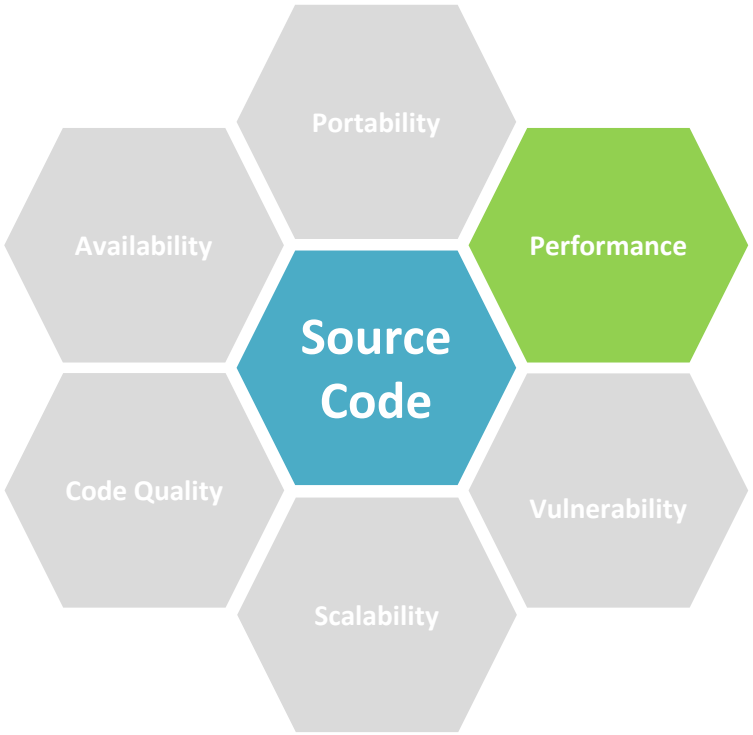
Sample Rules

Found instance of database operation(s) using the MS SQL provider

Found instance of hardcode locale specific strings

Cloud Native Performance Anti-Patterns

6 Key Metrics



Performance

Maintain application responsiveness under increased load

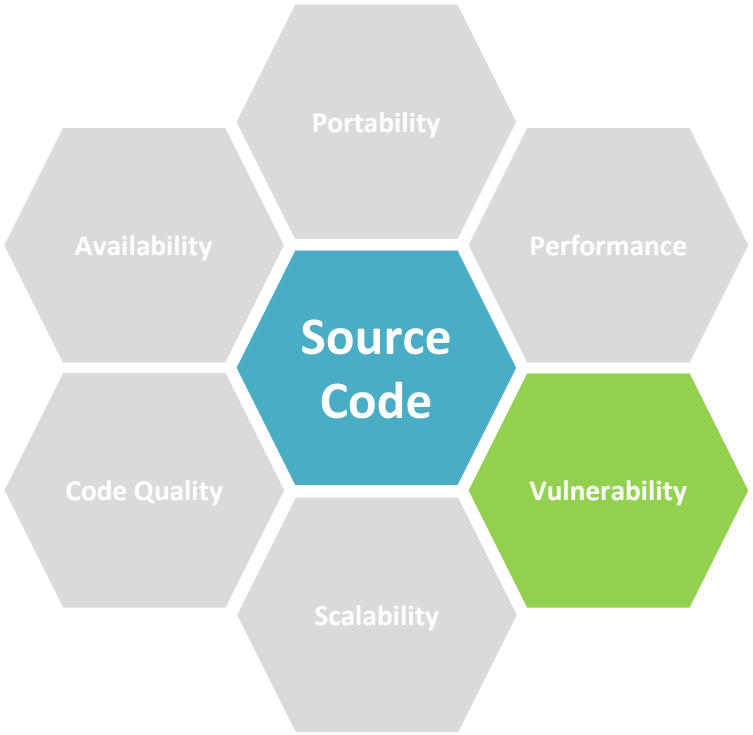
Sample Rules

Found instances of disposable fields that should be disposed

Detect usage of synchronous I/O operations in the application code

Cloud Native Vulnerability Anti-Patterns

6 Key Metrics



Vulnerability

Capability of a system to prevent malicious or accidental actions outside of the designed usage

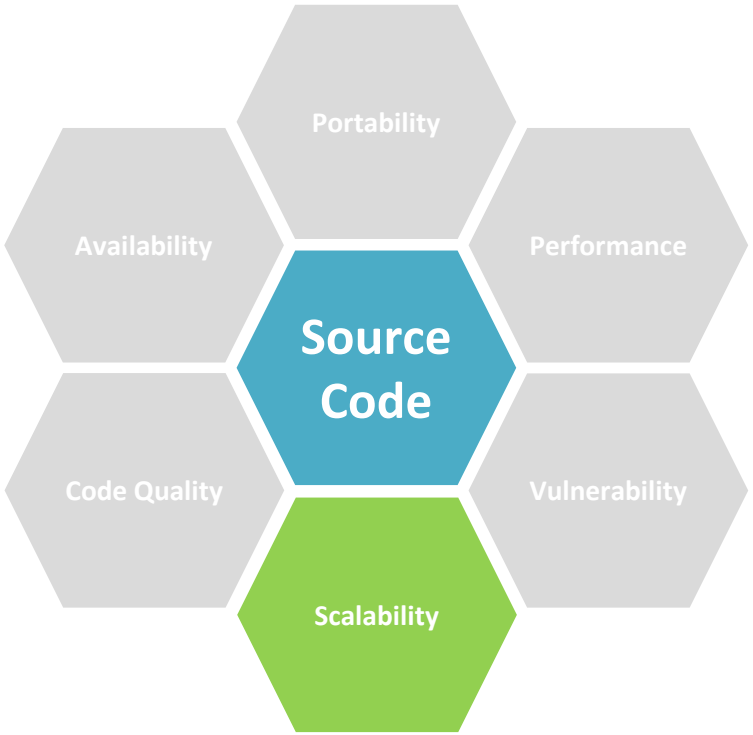
Sample Rules

Detects usage of Unencrypted FTP/HTTP sessions in the code

Detects usage of System.loadlibrary in the code, which can be used by the attacker to inject arbitrary code into the application and execute it

Cloud Native Scalability Anti-Patterns

6 Key Metrics



Scalability

Potential of the application to accommodate range of capabilities

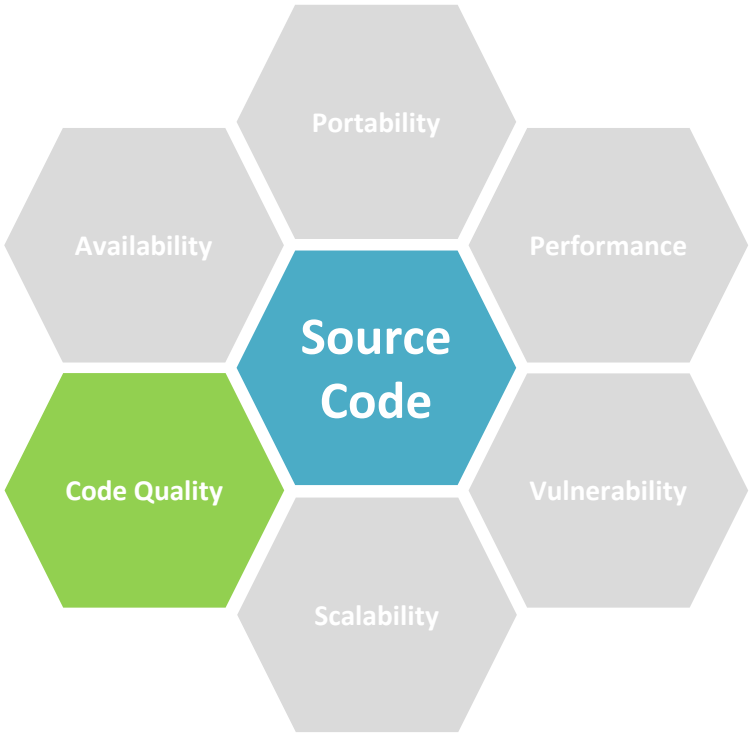
Sample Rules

Found instance of ASP.NET Session (HttpSessionState)

Identify the usage of machine specific socket (SSL or otherwise) usage in the application code

Cloud Native Availability Anti-Patterns

6 Key Metrics



Code Quality

Measure of an application code's technical debt

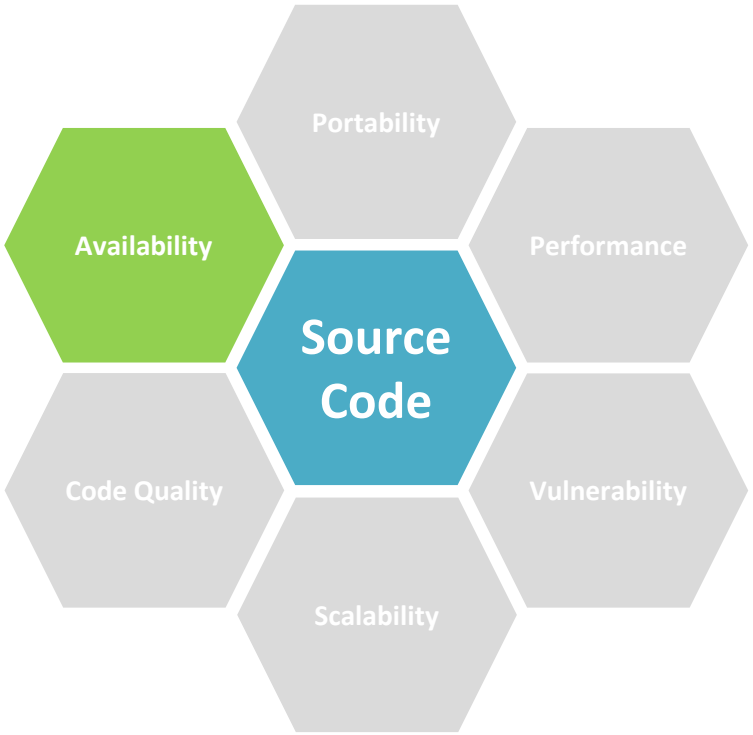
Sample Rules

Abstract types should not have constructors

Found instance of .NET Catch IO Exceptions (System.IO.IOException)

Cloud Native Availability Anti-Patterns

6 Key Metrics



Availability

Ability of application code to mask service outage faults

Sample Rules

Detect usages of any local files in the application

Identify the hardcoded IPs in the application code

Automating the Code Analysis

Manually reviewing application code for cloud native anti-patterns is time consuming, resource intensive, and highly error prone.

Deloitte's Stormfury Static Code Analyzer

Analysis of **800+** rules through industry research

Classification of barriers across the **6** key cloud native metrics

Implementation of **130+** cloud anti-pattern rules

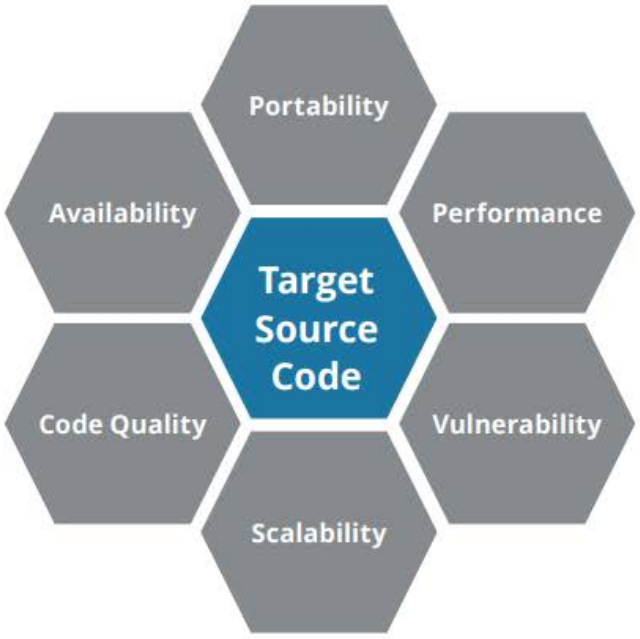
Dashboards to visualize code quality insights

Deloitte's Stormfury scans millions of lines of application code for cloud anti-patterns in minutes

Static Code Analysis

The output of application code for cloud anti-patterns can yield key insights across all levels of the IT organization

6 Key Cloud Native Metrics + **Quality Dashboard** = **Stakeholder Insights**



IT Leadership

- Should we redesign, rewrite, or replace the application for Cloud Native?
- How much effort and funding is required to redesign the code to be Cloud Native?

Technical Architects

- Where are the opportunities to redesign the code base and what are the complex areas of the system?
- What are the top areas that can leverage the cloud?

Developers on Check-in

- Have I created any new issues? If yes, where in the code?
- How do I address the issue?

An automated cloud native code anti-pattern scan will lower the cost, reduce the risk, and improve efficiency of a cloud migration effort

Case Studies of automated code analysis for cloud anti-patterns

Client	Objective	Solution	Value Delivered	Client Testimonials
Global Financial Services Client	Accelerate journey to AWS platform and adopt a cloud-first policy.	➢ Assess individual applications' cloud suitability and increase the pipeline of cloud candidates based on tech stacks and application architecture. ➢ Accelerate the migration and decommissioning of their on-premise analytics platform and shift to AWS EMR.	➢ Identified over 1.1K bugs related to cloud migration areas in 320K+ LOC. ➢ Detailed issue descriptions, severity levels, and mitigations steps enabled development team to prioritize findings and begin fixing them in one week. ➢ Accelerated areas to look at in the tool without having to do manually search though hundreds of source files.	➢ Really happy with what the product has found. ➢ It helped us target the big ticket findings and fix them immediately
Global Foundation for Life Sciences and Healthcare	Rapidly adopt cloud infrastructure for their drug development operations in a next-generation R&D model. This migration effort is the key to align the data, people, and processes within R&D organizations.	➢ Assess the application's cloud maturity based on level of inherited technical debt.	➢ Identified over 40 bugs in various quality attributes related to Cloud migration in a 200K+ LOC application. ➢ Category level issue counts and remediation effort enabled funding decisions. ➢ Effective resolution of multiple issues related to exception handling, class loaders and other cloud anti-patterns in the code.	➢ Extremely satisfied with the level of analysis and key findings discovered by Stormfury. ➢ Helped track and rapidly correct deviations from coding standards ➢ Helped make the application more suitable for cloud ➢ Memory overheads were reduced – Unused variables and objects were removed from the application
Large State Health & Human Services Agency	Migrate a large state based marketplace with complex functionality and large code base to a cloud infrastructure.	➢ Proactive identification of potential issues that hinder migration	➢ Identified over 700 bugs across various cloud native quality attributes in 900K+ LOC. ➢ Educated development team on cloud native coding practices. ➢ Fast-tracked the code refactoring process	➢ Stormfury has helped the client mitigate a key unknown in its cloud migration project. ➢ Stormfury's easy to understand descriptions and mitigation steps made it really easy for developers to address the 700+ cloud migration issues.

Reference

Stormfury Video

https://players.brightcove.net/5472387872001/S1dWZWLQtb_default/index.html?videoId=5760188439001