Software testing

Testing tools and services

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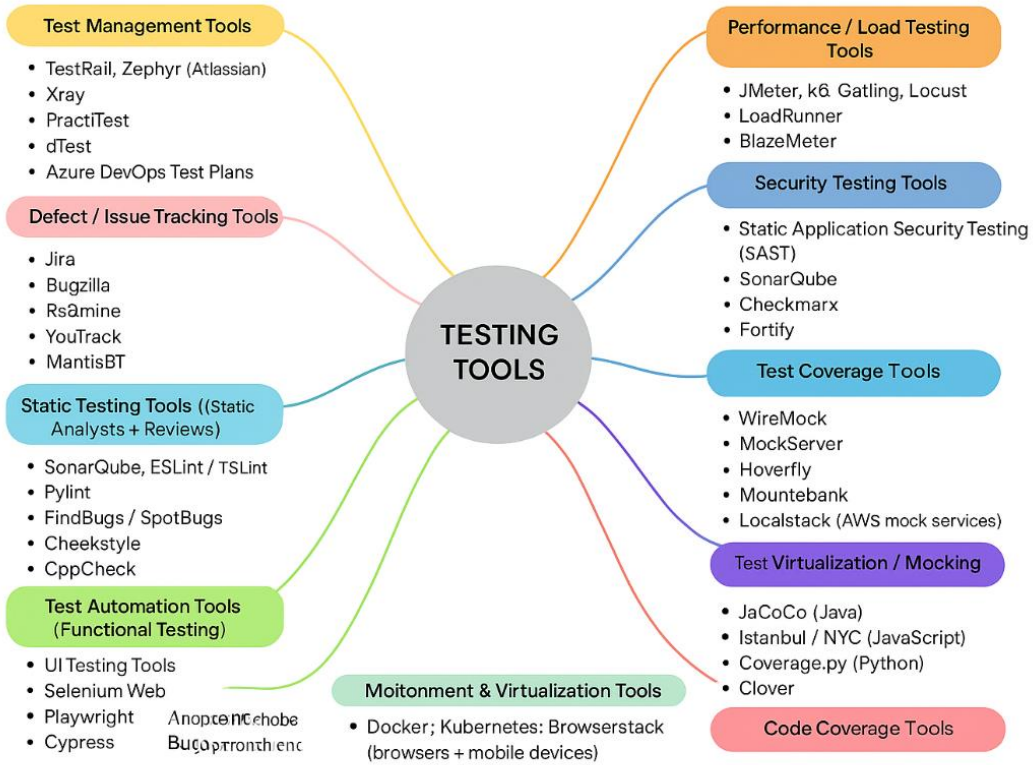
Contents

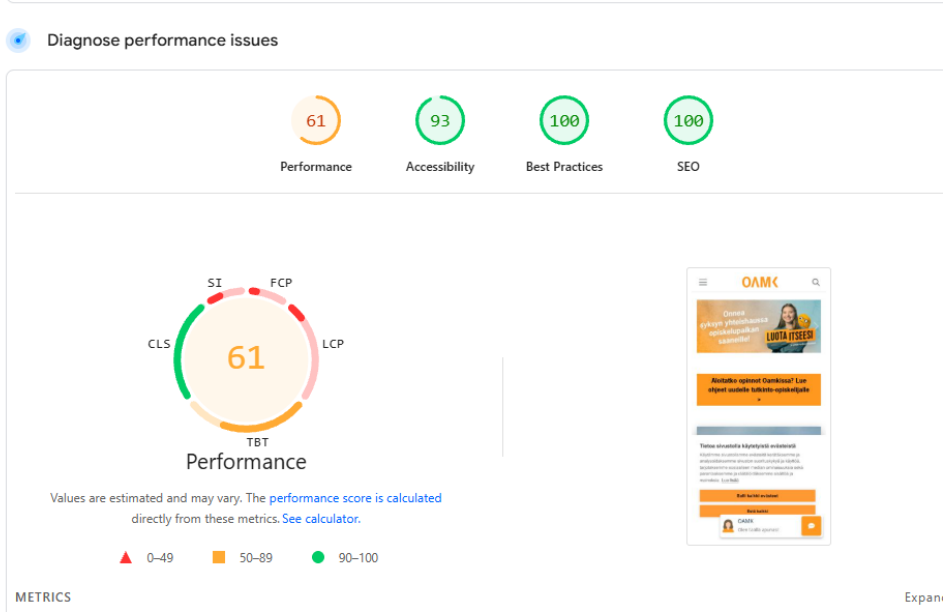
Categories of testing tools

- Test management tools (e.g. xRay)
- Issue tracking tools (e.g. Jira, Bugzilla)
- Static testing tools (e.g. ESLint)
- Test automation tools (e.g. Playwright, Cypress, Selenium, Robot Framework)
- Performance testing tools (e.g. Apache JMeter)
- Security testing tools (e.g. ZAP)
- Test data management tools (e.g. Informatica TDM)
- Enviroment & Virtualization tools (e.g. BrowserStack)
- …



Page Speed Insights

- A free service developed by Google that tests the performance, accessibility, best practices, and search engine optimization of a website, separately for mobile and desktop usage
- Figure illustrates test results for Oamk's website
- The service provides detailed analyses for all areas, including suggestions for improvements.
- https://pagespeed.web.dev/
- https://developers.google.com/speed/docs/insights/v5/about



Chrome Developer Tools

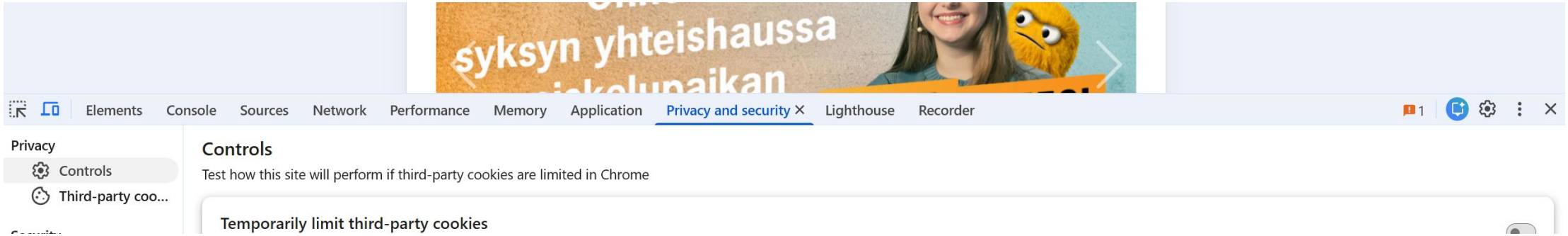
• A tool found in Google's web browser, intended for developers to develop and test websites and applications

• Popular among programmers, but testers can also find useful features (e.g., Lighthouse)

• Suitable for testing targets in a local environment, but in certain cases (e.g., Lighthouse), they must be on a local server

• https://developer.chrome.com/docs/devtools

• The figure below shows the tool's menu with different function



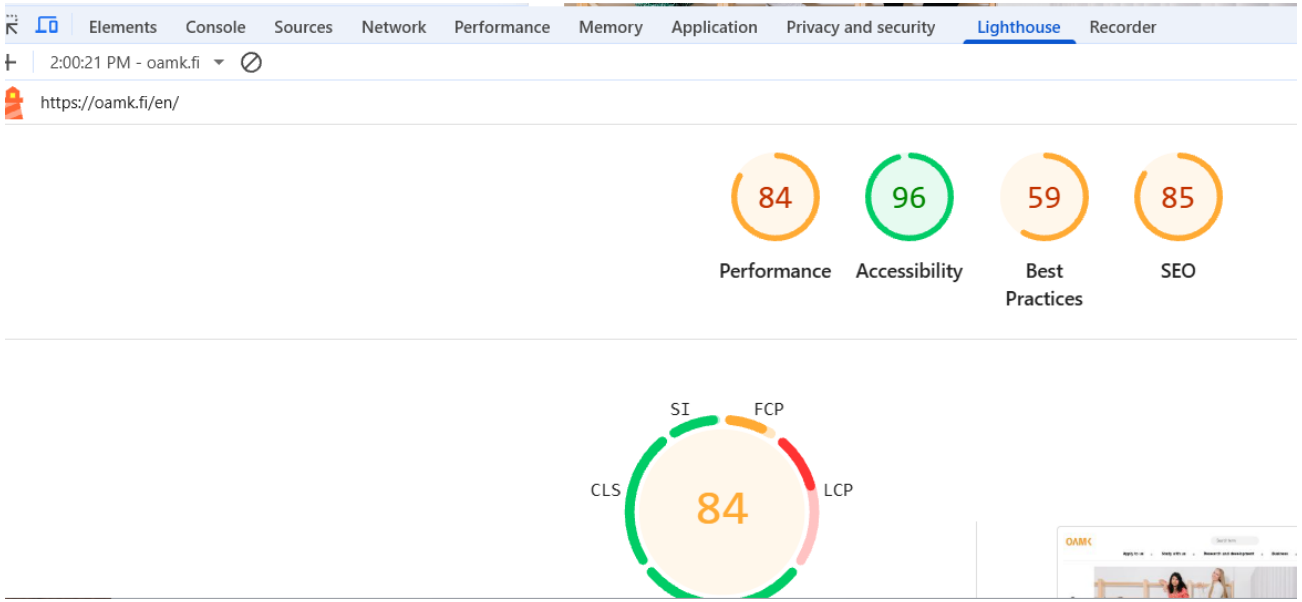
Lighthouse

• A service included in the Chrome Developer Tools web browser, similar to Page Speed Insight

• Also suitable for testing targets located in a local environment, but they must be on a local server

• https://developer.chrome.com/docs/devtools

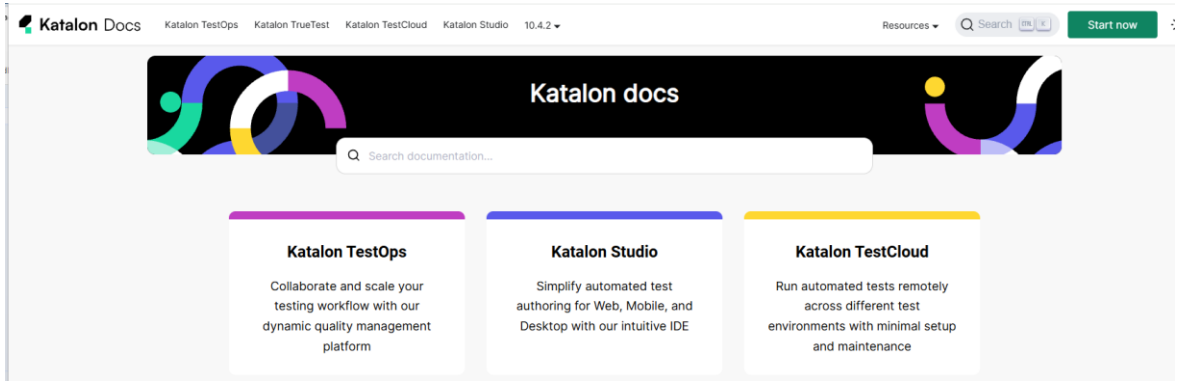
• The figure shows results generated by Lighthouse



OAMK

Katalon

- Katalon on useKatalon is a product family consisting of several tools for testing different types of applications (web, mobile, and desktop) as well as interfaces (API)
  - o Katalon Studio is the main tool in the product family for test automation
  - o Katalon TestOps is a management tool for testing, which includes support for teamwork
  - o Katalon TestCloud enables remote execution of tests on different machines, taking into account different browsers (cross-browser testing)
  - o Katalon Recorder is a free browser extension for recording and replaying tests
  - o https://docs.katalon.com/



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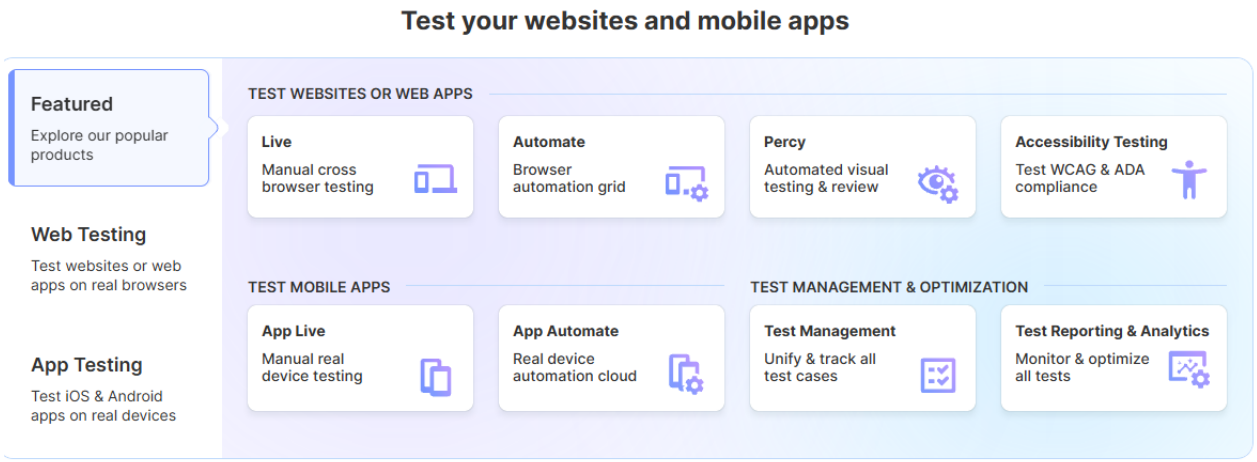
Jira and xRay

- Jira is a software developed by Atlassian for project management and test management. It is a very common tool in software development.
- xRay extends Jira's features to support testing, and together they include, among other things, the following functionalities
  - o Creation and maintenance of requirements
  - o Creation and maintenance of test plans
  - o Creation and maintenance of test sets and test cases
  - o Reporting of test results
  - o Bug tracking
  - o Integration with test automation (supports several automation tools)
- https://docs.getxray.app/space/XRAY/159809537/About+Xray

BrowserStack

- Tämä oli environment & virtualization AI:n mielestä
- Open and flexible test platform with various tools for testing web and mobile apps
  - Cross-browser testing
  - Automated visual testing and review
  - Accessibility testing
  - Supports real mobile devices
  - Test management
  - …
- https://www.browserstack.com/



ESLint

- Not actually a testing tool (does not run any tests), but supports testing by improving code quality by executing static analysis (linting), so it can be seen as a static testing tool
- Helps maintain clean, reliable and testable code
- Identifies problematic patterns found in JavaScript code
  - o Syntax errors
  - o Bad patterns
  - o Potential bugs
  - o Inconsistent styling
  - o Unused variables
  - o Unsafe code
  - o Deprecated APIs
  - …

Playwright

- Reliable end-to-end (E2E) testing for modern web apps
- Cross-browser
  - o Supports modern web rendering engines including Chromium, Webkit, and Firefox
- Cross-platform
  - o Test on Windows, Linux, macOS, locally or on CI (Continuous Integration), headless or headed
- Cross-language
  - o Use TypeScript, JavaScript, Python, .NET, Java

```
import { test, expect } from '@playwright/test';

test('has image', async ({ page }) => {
  await page.goto('http://localhost:8080/');

  const img = page.locator('img')

  await expect(img).toHaveAttribute('src')
  expect(await img.getAttribute('src')).toContain('images/1.png')
})

test('rolls dice', async ({ page }) => {
  await page.goto('http://localhost:8080/');

  const div = page.locator('#dice')
  const img = page.locator('img')
  // Set image to empty string before clicking div to randomize new dice (image).
  await img.evaluate(element => element.setAttribute('src',''))
  await div.click()
  expect(await img.getAttribute('src')).toContain('.png')
})
```

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Cypress

- Cypress is a tool based on JavaScript, whose key components are
  - o End-to-End (E2E) Testing: Executes a specific test scenario from start to finish, aiming to simulate a real situation
  - o Component Testing: Essentially unit testing for individual components
- Supports accessibility and UI testing
- https://docs.cypress.io/app/get-started/why-cypress

```
cy.get('button').then(($btn) => {

  // store the button's text
  const txt = $btn.text()

  // submit a form
  cy.get('form').submit()

  // compare the two buttons' text
  // and make sure they are different
  cy.get('button').should(($btn2) => {
    expect($btn2.text()).not.to.eq(txt)
  })
})

// these commands run after all of the
// other previous commands have finished
cy.get(...).find(...).should(...)
```

Selenium

- Selenium is a product family consisting of several tools for testing browser-based applications
  - o Selenium WebDriver enables writing test scripts in several different programming language
  - o Selenium IDE is a browser extension for recording and replaying tests, as well as editing them
  - o Selenium Grid allows test scripts created with WebDriver to be executed remotely on different machines, supporting different browsers (cross-browser testing)
- https://www.selenium.dev/

Selenium WebDriver

Selenium IDE

Selenium Grid

Robot Framework

- An open-source tool for test automation developed in Finland. It is a very common tool in software development.
  - o Requires Python
  - o User-friendly language for writing test
  - o An active developer community produces a wide range of libraries, which provide additional possibilities for utilizing the tool
- https://docs.robotframework.org/

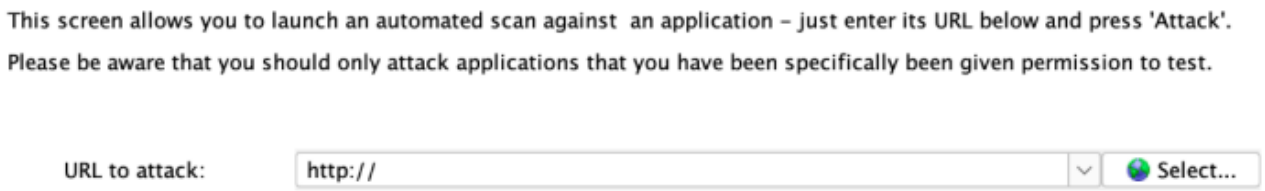

```
*** Test Cases ***
Valid Login
    Open Login Page
    Input Username    demo
    Input Password    mode
    Submit Credentials
    Welcome Page Should Be Open

Setting Variables
    Do Something    first argument    second argument
    ${value} =    Get Some Value
    Should Be Equal    ${value}    Expected value
```

Apache JMeter

- An open-source tool for various types of performance testing
- Typical use is performance testing, where you can simulate load or stress (e.g., a large number of simultaneous users
- Originally developed for web application performance testing, but can also be used for desktop application testing
- 100% Java application, which means it can be run on any operating system where a Java virtual machine can be installed
- **NOTE! Do not execute performance/load testing on a target that is online without agreeing with the owner of the target beforehand to avoid accidentally causing any harm, such as denial-of-service attack**
- https://jmeter.apache.org/usermanual/get-started.html

Zed Attack Prozy (ZAP)

- A security testing tool, long developed by the OWASP organization. The current developer is Checkmarx.
- Typical use is penetration testing, where a test target is subjected to a series of simulated attacks to find vulnerabilities
- **NOTE! Do not execute security testing on a target that is online without agreeing with the owner of the target beforehand to avoid accidentally causing any harm, such as denial-of-service attack**
- https://www.zaproxy.org/docs/



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