🧰 What is Selenium?

Selenium is a mature and widely-used automation framework that allows testers to write tests in multiple languages (Java, Python, C#, etc.) and run them on various browsers.

- **Language Support**: Java, Python, C#, Ruby, JavaScript
- **Browser Support**: Chrome, Firefox, Safari, Edge, IE
- **Execution Layer**: WebDriver Protocol

✅ Pros

- Mature ecosystem with wide community support
- BrowserStack, SauceLabs integration
- Supports parallel and distributed testing via Selenium Grid

❌ Cons

- Slower execution due to reliance on the WebDriver
- Complex setup for browser drivers
- Flaky tests due to asynchronous browser behavior

🧪 Typical Use Cases

Use Case	Selenium	Playwright
Cross-browser testing (including IE)	✅ Yes	❌ No IE support
Fast feedback with modern browsers	⚠️ Slower	✅ Fast
CI/CD Integration	✅ Well-supported	✅ Seamless
Test flakiness reduction	⚠️ Manual waits required	✅ Auto-waiting

Use Case	Selenium	Playwright
Mobile web testing	✅ With Appium	⚠️ Limited support

🧱 Real-World Test Scenario Example

✅ Scenario: User Login Flow

🔹 Selenium Example (Python)

```python
driver.get("https://myapp.com/login")
driver.find_element(By.ID, "username").send_keys("admin")
driver.find_element(By.ID, "password").send_keys("password")
driver.find_element(By.ID, "submit").click()
assert "Dashboard" in driver.title
```

🔹 Playwright Example (Python)

```python
page.goto("https://myapp.com/login")
page.fill("#username", "admin")
page.fill("#password", "password")
page.click("#submit")
page.wait_for_url("**/dashboard")
assert "Dashboard" in page.title()
```

📊 Comparison Summary

Feature	Selenium	Playwright
Browser Support	✅ Broad (incl. IE)	✅ Modern browsers only
Execution Speed	⚠️ Slower	✅ Faster
	❌ Manual waits	✅ Built-in

Feature	Selenium	Playwright
Auto-wait for Elements		
Setup Complexity	⚠️ Driver configuration	✅ One-liner setup
Test Stability	⚠️ Flaky at times	✅ More stable
Debugging Tools	⚠️ Manual logs	✅ Tracing, video, screenshots
Mobile/Web Hybrid	✅ With Appium	⚠️ Limited

🧾 Conclusion

Both **Selenium** and **Playwright** are powerful tools for E2E testing. If you're working with legacy browsers or enterprise stacks, Selenium remains a solid choice. However, for modern web applications, **Playwright offers a faster, more reliable**, and **developer-friendly** testing experience.

> ✅ **Recommendation**: Choose **Playwright** for modern applications and CI-first pipelines. Choose **Selenium** if you require legacy browser support or have an existing large test suite in Selenium.