

Why CSS Selector is faster than XPath

CSS Selector is considered faster mainly because of **how browsers internally process elements**.

1. Browser Engines Are Optimized for CSS

Browsers (Chrome, Firefox, Edge) are built to **render CSS first**, so their engines are highly optimized to read and match CSS selectors quickly.

XPath requires more complex parsing → slower in comparison.

2. XPath Allows Traversing Both Directions (forward & backward)

XPath can move:

- From parent → child
- From child → parent
- From sibling → sibling

This **bi-directional traversal** requires extra computation.

CSS can only move **top-down** (parent → child), making it quicker.

3. XPath Has More Complex Syntax

XPath expressions often involve:

- Conditions
- Indexing
- Axes (ancestor, following-sibling, preceding-sibling, etc.)

This complexity means **browser has to do more work**, making evaluation slower.

4. CSS Is Native to Browser Rendering

CSS Selectors are part of the browser's **native rendering engine**, the same engine used for styling the page.

XPath is **not native** — it requires the browser to use an external XPath engine.

5. Cross-Browser Performance

Not all browsers have equally optimized XPath engines.

But **all browsers support CSS efficiently**, making CSS consistently faster and more stable.