



## ***East West University***

*Department of Computer Science and Engineering (CSE)*

*Semester: (Fall, Year: 2025), B.Sc. in CSE*

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### **Analysis of Modern Web Browsers**

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***Course Code: CSE412***

***Course Title: Software Engineering***

***Section: 5***

#### **Submitted to:**

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### Common Prominent Features (Functional)

| Feature                | Brave   | Mozilla Firefox                                     | Microsoft Edge                                      |
|------------------------|---|---|---|
| Ad & Tracker Blocking  | Aggressive, built-in blocking by default.           | Standard tracking protection, configurable.         | Basic tracking prevention, configurable.            |
| Platform Support       | Windows, macOS, Linux, iOS, Android.                | Windows, macOS, Linux, iOS, Android.                | Windows, macOS, Linux, iOS, Android.                |
| Extension Support      | Extensive library via Chrome Web Store.             | Large, curated library of extensions.               | Growing library via Microsoft Store.                |
| Cross-Platform Sync    | Automatically syncs bookmarks, passwords, settings. | Automatically syncs bookmarks, passwords, settings. | Automatically syncs bookmarks, passwords, settings. |
| Hardware Acceleration  | Uses the GPU to render web pages and media.         | Uses the GPU to render web pages and media.         | Uses the GPU to render web pages and media.         |
| Autofill               | Securely saves and fills personal information.      | Securely saves and fills personal information.      | Securely saves and fills personal information.      |
| Accessibility Features | Supports screen readers, high contrast, zoom.       | Supports screen readers, high contrast, zoom.       | Supports screen readers, high contrast, zoom.       |
| Text-to-Speech         | Available via extensions.                           | Built-in "Read Aloud" feature.                      | Built-in "Read Aloud" feature.                      |
| Web Standards Support  | Excellent support for HTML5, CSS3, JS.              | Excellent support for HTML5, CSS3, JS.              | Excellent support for HTML5, CSS3, JS.              |
| Developer Tools        | Comprehensive suite (Inspector, Console).           | Comprehensive suite (Inspector, Console).           | Comprehensive suite (Inspector, Console).           |

### Common Characteristics & Properties (Non-Functional)

These browsers share critical non-functional properties that define their quality and user experience.

- ❖ **Performance:** All three browsers are highly optimized for speed and responsiveness, ensuring quick page loads and smooth interaction.
- ❖ **Security:** They provide robust protection against malware, phishing, and other online threats through features like sandboxing and safe browsing databases.
- ❖ **Reliability:** The browsers are stable and function consistently across different websites and platforms, minimizing crashes and errors.
- ❖ **Usability:** With intuitive interfaces and user-friendly designs, they are easy for users of all skill levels to navigate and control.
- ❖ **Scalability:** All three are capable of handling a large number of open tabs and intensive web applications without a significant degradation in performance.

### Software Proposal: The Spark Browser

#### **Proposed Features (Functional):**

| Specifications        | Description   |
|-----------------------|---|
| Core Browsing         | Renders all modern websites correctly using a standard, open-source engine.               |
| Default Security      | Blocks trackers, malicious scripts, and fingerprinting automatically out of the box.      |
| Integrated VPN/Proxy  | Provides an optional, built-in VPN service to hide the user's IP address.                 |
| Ad & Content Blocking | Includes a powerful, built-in ad-blocker to remove all types of intrusive ads.            |
| Privacy Dashboard     | Shows a real-time summary of all blocked ads and trackers on the current site.            |
| "Focus Mode"          | Offers a reader view that removes clutter like ads and sidebars for focused reading.      |
| Session Isolation     | Provides a special mode to automatically delete all data from a specific tab when closed. |
| Extension Support     | Allows users to install third-party extensions that have been vetted for security.        |
| Cross-Platform Sync   | Securely syncs bookmarks, passwords, and settings across all the user's devices.          |
| Secure Updates        | Automatically keeps the browser and its security features up-to-date in the background.   |

## Proposed Characteristics & Properties (Non-Functional):

| Specifications       | Description   |
|----------------------|---|
| Performance          | Loads web pages faster than major competitors like Chrome and Firefox.                          |
| Resource Utilization | Uses minimal CPU and RAM, ensuring the browser is fast and doesn't slow down the computer.      |
| Security             | Enforces secure connections (HTTPS) and uses strong encryption to protect all stored user data. |
| Usability            | Features a simple, clean, and intuitive user interface with privacy-focused defaults.           |
| Reliability          | Is highly stable and has a crash rate that is significantly lower than the industry average.    |
| Maintainability      | Built with open-source code to allow for public security audits and quick fixes.                |
| Data Policy          | Has a strict zero-telemetry policy, collecting no user data without explicit permission.        |

### Use Case of Spark Browser

#### ❖ **Actors:**

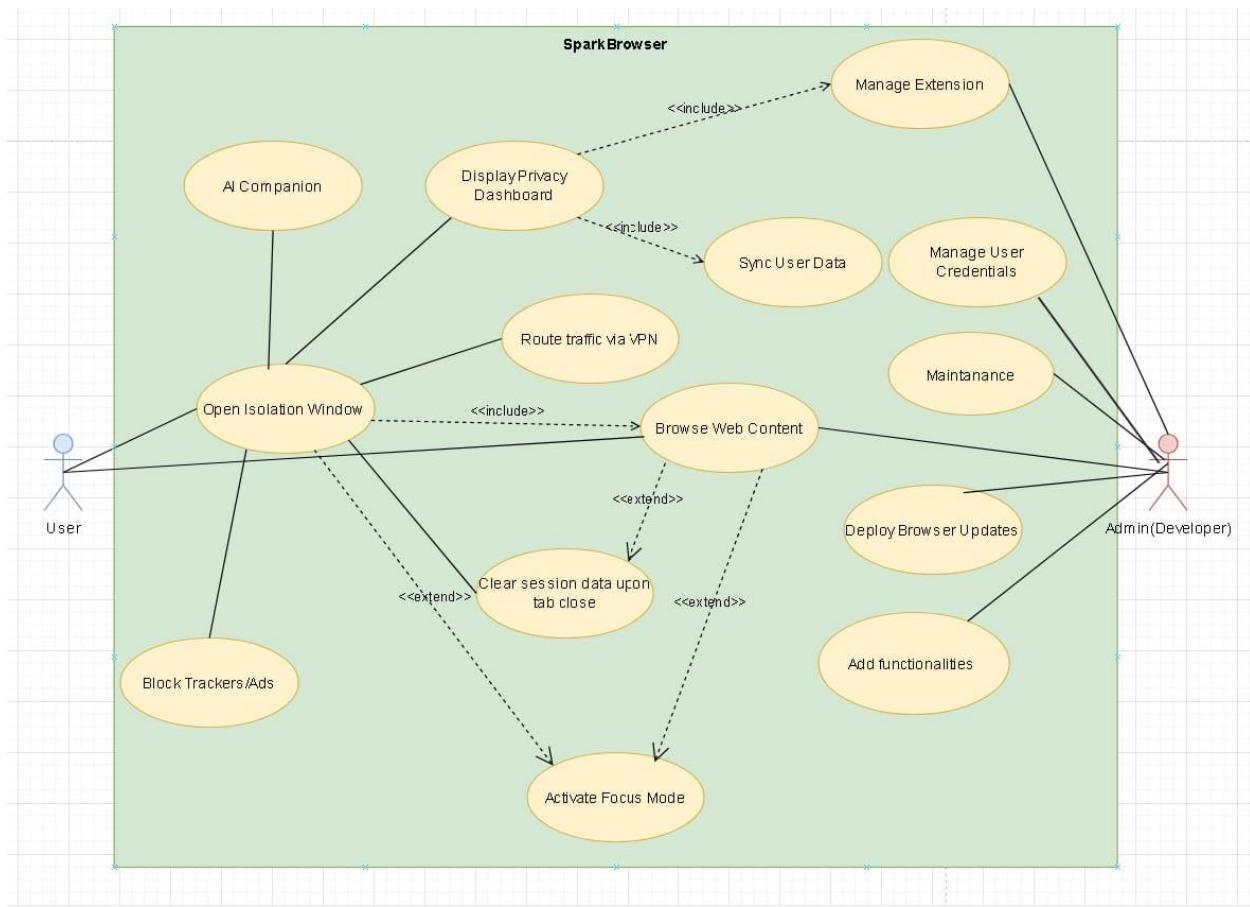
- **User:** A general user who performs daily browsing tasks.
- **Admin (Developer):** A developer or administrator responsible for system maintenance, development, and updates.

#### ❖ **User Actions:**

- Initiate an Isolation Window for a private, sandboxed browsing session.
- Browse the web with automatic ad/tracker blocking.
- Route traffic through a built-in VPN.
- Use an AI Companion for assistance.
- View the Privacy Dashboard, which provides access to manage extensions, sync data.
- Optionally activate Focus Mode to reduce distractions.
- Optionally clear session data automatically when a tab is closed.

#### ❖ **Admin (Developer) Actions:**

- Perform system maintenance.
- Add new functionalities to the browser.
- Deploy browser updates.
- Manage user credentials and extensions.
- Oversee user data synchronization.



**Figure:** Use-Case Diagram of Spark Browser