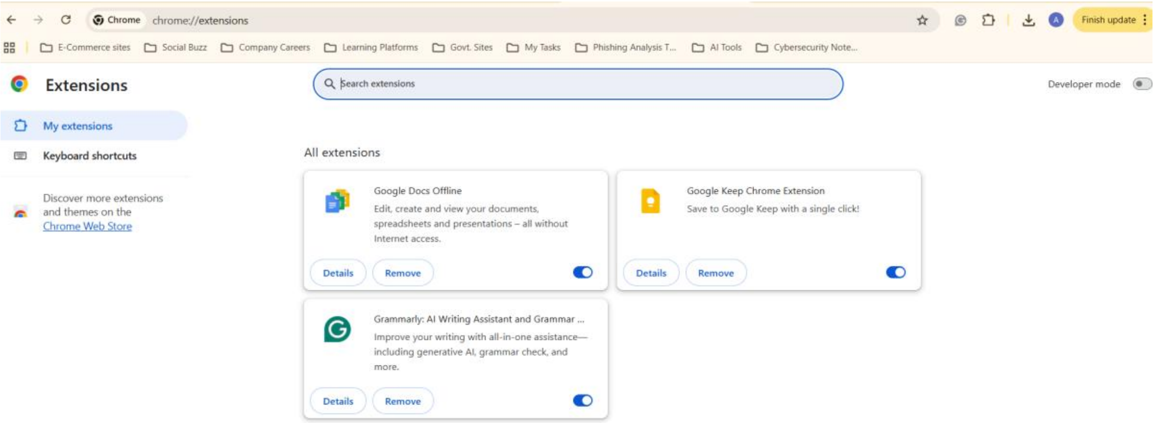
Browser Extension Management and Performance Analysis Report

Objective: To identify, manage, and understand the impact of browser extensions on browser performance and security.

Part 1: Extension Management and Performance Testing Summary

1. Browser Extension Management Actions:

* Accessed the browser's extension/add-ons manager.
* Reviewed currently installed extensions.



chrome://extensions

All extensions

Google Docs Offline
Edit, create and view your documents, spreadsheets and presentations – all without Internet access.

Google Keep Chrome Extension
Save to Google Keep with a single click!

Grammarly: AI Writing Assistant and Grammar ...
Improve your writing with all-in-one assistance—including generative AI, grammar check, and more.

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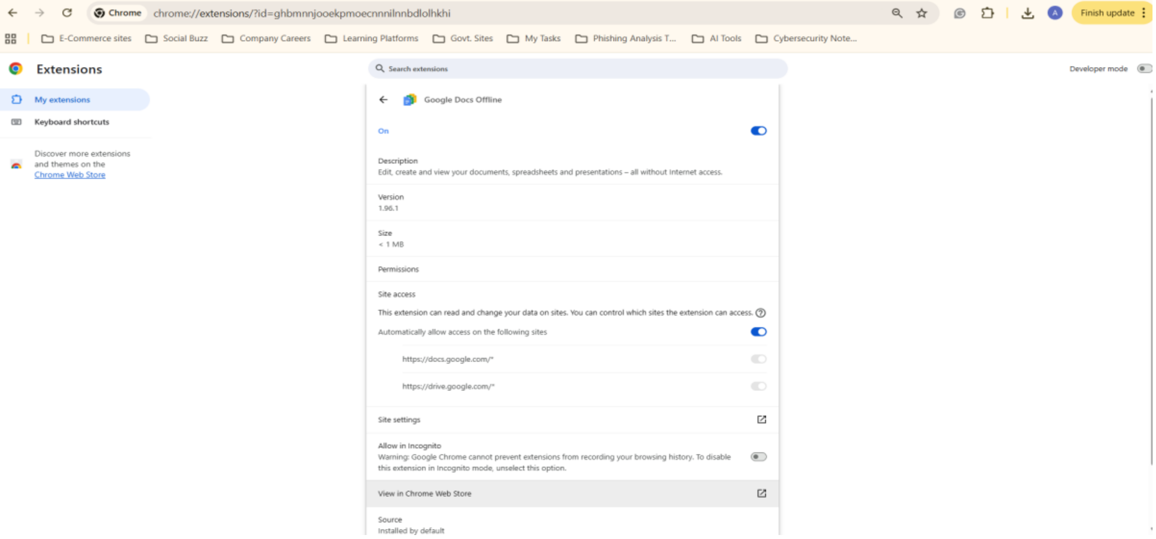
* Temporarily installed the "Google Keep" extension for testing purposes.
* Checked permissions and general reviews associated with the extensions.



chrome://extensions/?id=ghbmnnjooekpmoecnnnilnnbdlolhkhi

Google Docs Offline

On

Description
Edit, create and view your documents, spreadsheets and presentations – all without Internet access.

Version
1.96.1

Size
< 1 MB

Permissions

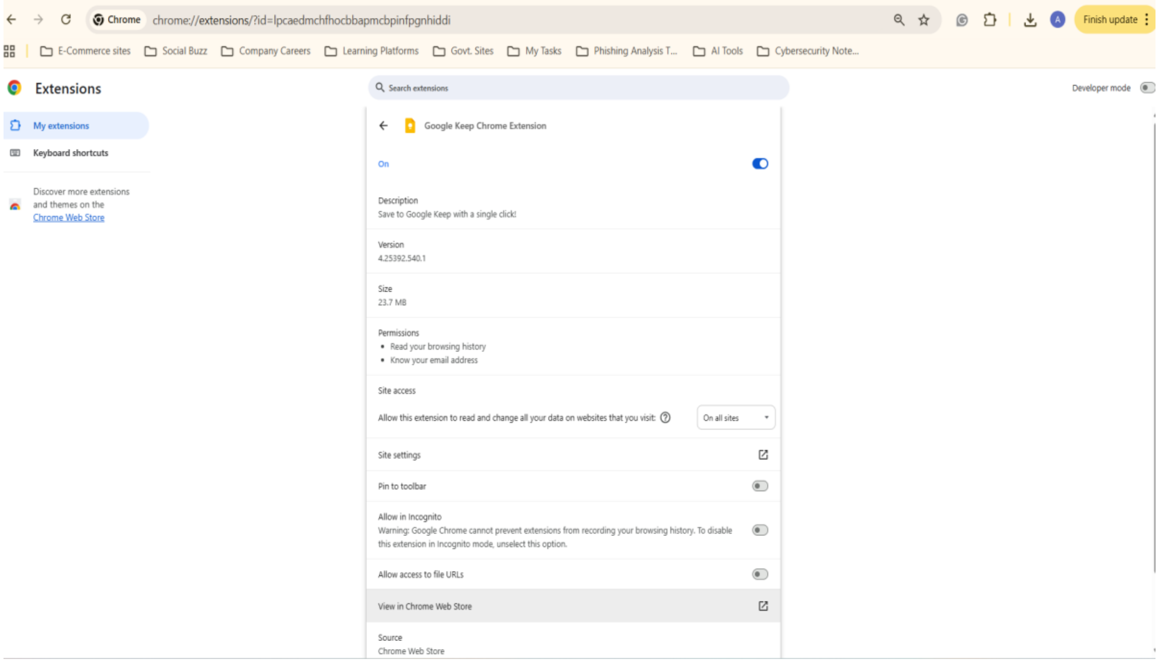
Site access
This extension can read and change your data on sites. You can control which sites the extension can access.
Automatically allow access on the following sites
https://docs.google.com/*
https://drive.google.com/*

Site settings

Allow in Incognito
Warning: Google Chrome cannot prevent extensions from recording your browsing history. To disable this extension in Incognito mode, unselect this option.

View in Chrome Web Store

Source
Installed by default



chrome://extensions/?id=lpcaedmchfhocbbapmcbpinfpgnhiddi

Google Keep Chrome Extension

On

Description
Save to Google Keep with a single click!

Version
4.25392.540.1

Size
23.7 MB

Permissions
- Read your browsing history
- Know your email address

Site access
Allow this extension to read and change all your data on websites that you visit: On all sites

Site settings

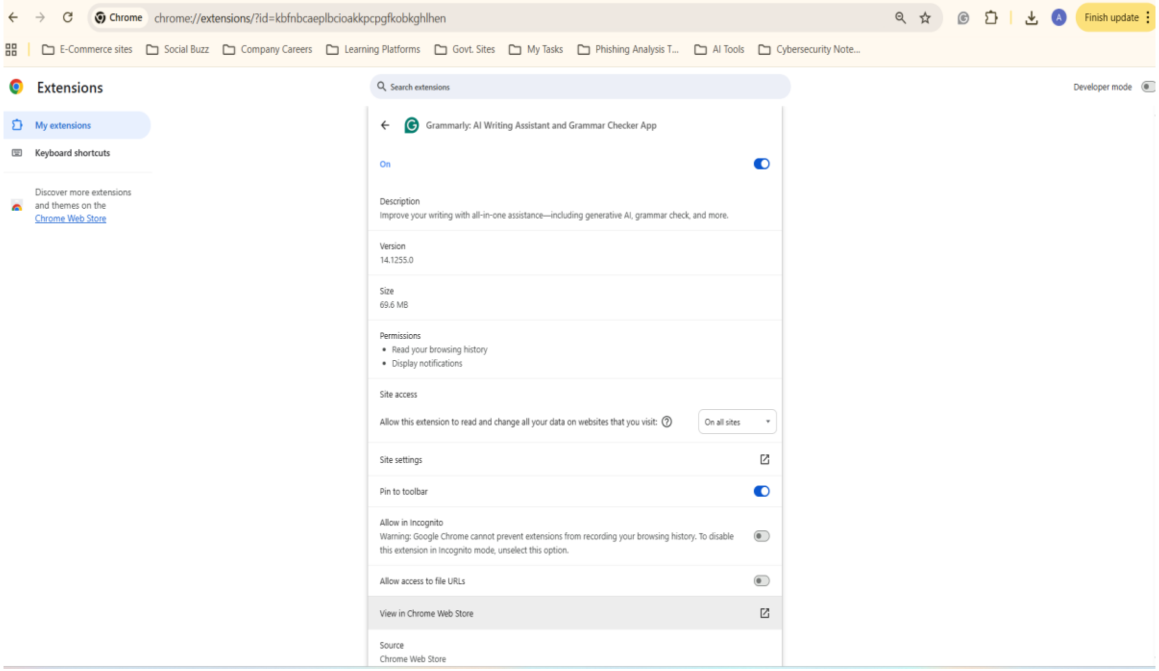
Pin to toolbar

Allow in Incognito
Warning: Google Chrome cannot prevent extensions from recording your browsing history. To disable this extension in Incognito mode, unselect this option.

Allow access to file URLs

View in Chrome Web Store

Source
Chrome Web Store



chrome://extensions/?id=kbfnbcaeplbcioakkpcpgfkobkghlhen

Grammarly: AI Writing Assistant and Grammar Checker App

On

Description
Improve your writing with all-in-one assistance—including generative AI, grammar check, and more.

Version
14.1255.0

Size
69.6 MB

Permissions
- Read your browsing history
- Display notifications

Site access
Allow this extension to read and change all your data on websites that you visit: On all sites

Site settings

Pin to toolbar

Allow in Incognito
Warning: Google Chrome cannot prevent extensions from recording your browsing history. To disable this extension in Incognito mode, unselect this option.

Allow access to file URLs

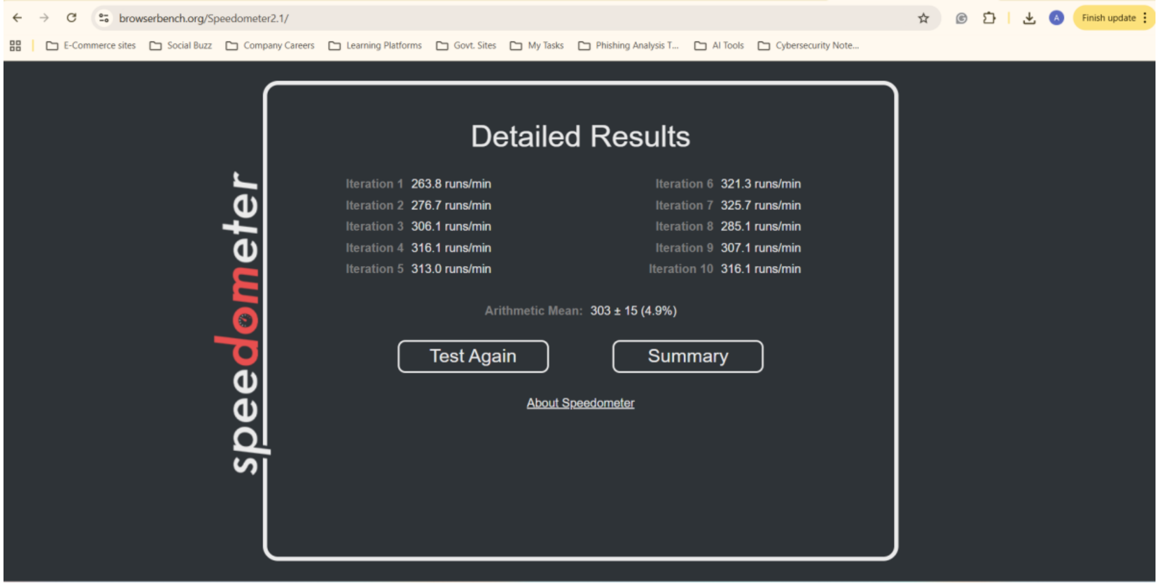
View in Chrome Web Store

Source
Chrome Web Store

* Removed the "Google Keep" extension after performance testing.

2. Performance Analysis using Speedometer 2.1:

* **Initial State (with Google Keep extension):**
* Speedometer 2.1 Score: 303 ± 15 (4.9%)

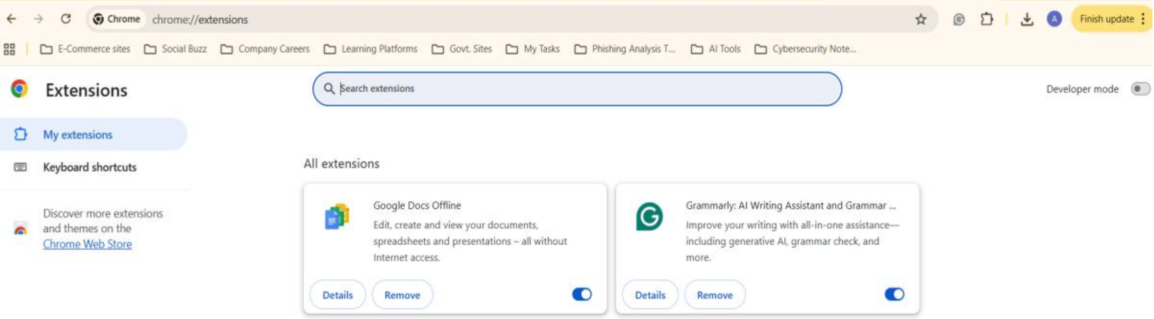


Detailed Results

Iteration 1	263.8 runs/min	Iteration 6	321.3 runs/min
Iteration 2	276.7 runs/min	Iteration 7	325.7 runs/min
Iteration 3	306.1 runs/min	Iteration 8	285.1 runs/min
Iteration 4	316.1 runs/min	Iteration 9	307.1 runs/min
Iteration 5	313.0 runs/min	Iteration 10	316.1 runs/min

Arithmetic Mean: 303 ± 15 (4.9%)

* **Post-Removal (without Google Keep extension):**
* Speedometer 2.1 Score: 313 ± 14 (4.5%)



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All extensions

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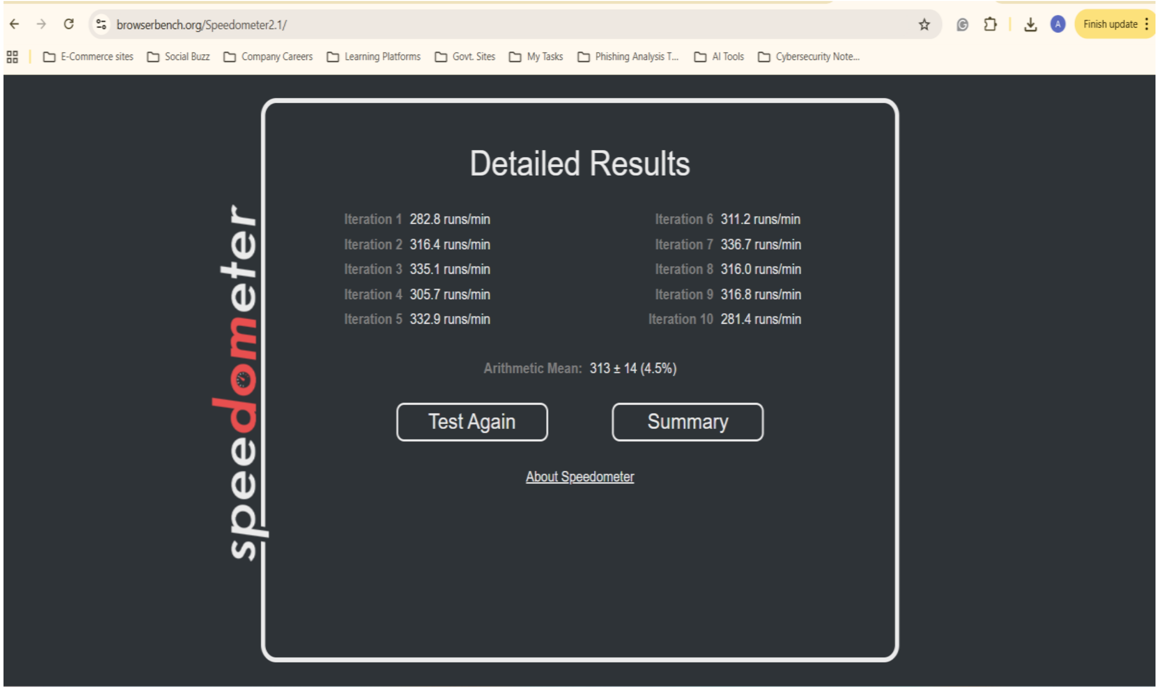
Improve your writing with all-in-one assistance—including generative AI, grammar check, and more.



Detailed Results

Iteration 1	282.8 runs/min	Iteration 6	311.2 runs/min
Iteration 2	316.4 runs/min	Iteration 7	336.7 runs/min
Iteration 3	335.1 runs/min	Iteration 8	316.0 runs/min
Iteration 4	305.7 runs/min	Iteration 9	316.8 runs/min
Iteration 5	332.9 runs/min	Iteration 10	281.4 runs/min

Arithmetic Mean: 313 ± 14 (4.5%)

3. Performance Observation:

* A slight performance improvement was noted after the removal of the Google Keep extension. The Speedometer 2.1 score increased from 303 runs/min to 313 runs/min. This demonstrates that even benign extensions can have a measurable, albeit minor, impact on browser performance.

Part 2: Research on Malicious Extensions and Documentation

4. How Malicious Extensions Can Harm Users:

Malicious browser extensions are a significant cybersecurity threat, often masquerading as useful tools. Their potential harms include:

- **Data Theft and Privacy Invasion:**
    - **Tracking:** Continuously monitor browsing history, search queries, and online activities.
    - **Credential Harvesting:** Employ keyloggers or fake login forms to steal sensitive information like usernames, passwords, and financial details.

  - **Personal Data Access:** Can access cookies, autofill data, and potentially information from other installed extensions.
  - **Adware & Pop-ups:** Inject unwanted advertisements, redirect users to malicious websites, or generate aggressive pop-ups leading to phishing or malware.
- **Security Vulnerabilities & System Compromise:**
  - **Malware Delivery:** Act as conduits for downloading and installing other forms of malware (e.g., ransomware, spyware, viruses).
  - **Phishing & Content Manipulation:** Alter legitimate website content or inject malicious scripts to facilitate phishing attacks or session hijacking.
  - **Cross-Site Scripting (XSS):** Exploit vulnerabilities to execute malicious code within web pages, potentially compromising user sessions.
- **Performance Degradation & Browser Hijacking:**
  - **Resource Consumption:** Consume significant CPU and memory, leading to slow browser performance, crashes, and overall system sluggishness.
  - **Browser Settings Alteration:** Illegitimately change homepage, default search engine, and new tab page settings, redirecting traffic to attacker-controlled sites.
  - **Undisclosed Activities:** Operate in the background, performing actions like cryptocurrency mining or click fraud without the user's consent, leading to increased resource usage and electricity bills.

5. Documented Steps Taken & Extensions Involved:

- **Steps Performed:**
  1. Accessed Google Chrome's extension management interface.
  2. Conducted an initial review of existing browser extensions.
  3. Installed "Google Keep" as a test extension.
  4. Executed Speedometer 2.1 benchmark with "Google Keep" installed to obtain a baseline performance score.
  5. Removed the "Google Keep" extension.
  6. Re-executed Speedometer 2.1 benchmark to measure performance after extension removal.

7. Analyzed and compared the performance scores.

8. Conducted research on the various ways malicious browser extensions can harm users.

- **Extensions Removed (during this exercise):**
  - "Google Keep" (a legitimate and safe extension, removed specifically for the purpose of observing performance changes in this exercise).

6. Document steps taken and extensions removed.

- **Documented Steps Taken:**
  1. Opened Google Chrome's extension management interface.
  2. Conducted an initial review of all installed extensions.
  3. Checked permissions and user reviews for extensions as part of a careful review process.
  4. Temporarily installed the "Google Keep" extension for the purpose of demonstrating extension impact.
  5. Executed Speedometer 2.1 to establish a performance benchmark with the test extension installed.
  6. Removed the "Google Keep" extension.
  7. Restarted the browser to ensure changes were fully applied.
  8. Executed Speedometer 2.1 again to measure browser performance after the extension's removal.
  9. Analyzed the performance difference observed between the two benchmark runs.
  10. Performed research on the various methods malicious browser extensions employ to harm users, covering privacy, security, and performance aspects.
- **Extensions Removed (during this exercise):**
  - **Google Keep:** (Note: This is a legitimate and safe extension; it was removed specifically for the practical demonstration of performance measurement and the exercise's objective of identifying and managing extensions.)