

A Appendix A: Prompt Design

```
You are a web performance expert.
Based on the following Lighthouse audit:

-----
"{audit_issues}"
-----

Due to the huge token size of HTML files,
You are given the HTML in chunks, one at a time.
Please modify each HTML code chunk to resolve the performance {issue_text} given above.

Make sure you:
1. Remember the code is split into chunks and you are only receiving one chunk at a time, there might be some
unclosed or cut elements, do not worry about that.
2. Consider that a chunk might be a part of a larger element, so the code might not be complete.
3. Consider that the HTML as a whole is from production and might be minified, uglified or compressed.
4. DO NOT modify class names
5. DO NOT remove any comments already in the code.
6. DO NOT change any styles or functionalities of the code.
7. DO NOT change the structure of the code.
8. DO NOT change the order of the code.
9. DO NOT remove critical elements.
10. If any optimizations are made, return `<!-- Optimized by LLM -->` at the beginning point of only the changed
portion
    and `<!-- End of Optimization: {{audit_key of issue being resolved}} => {{one line short description of
elements/things resolved}} -->` at the end of the changed portion.
    Do not indicate any resolution outside of the End of Optimization comment, where there are multiple
resolutions being made, separate them with commas within the End of optimization comment.
11. Return the modified HTML code alone, making only necessary changes for performance optimization.
12. If no optimizations are possible, return the original code.
13. Never add any additional comments to the code besides that of the instruction in #7.
14. If the change is within a `<style>` tag, replace the HTML comment with a CSS comment.

The original HTML code is as follows:

```html
{html_part}
```
```

Listing 2: Prompt template using performance audit

B Appendix B: Definitions & Coverage Ratios of Audits

Table 3: Audit data overview

| S/N | Audit Name | Audit Description | Count | Websites | Coverage |
|------------------------|----------------------------------|---------------------------------------------------------------------------------------------------------------------------|-------|------------------------------------------------------------------------------------------------------------------------------------|----------|
| 1 | first-contentful-paint | First Contentful Paint marks the time at which the first text or image is painted | 15 | airbnb, aliexpress, ebay, facebook, github, linkedin, medium, netflix, pinterest, quora, reddit, twitch, twitter, walmart, youtube | 100.0 |
| 2 | speed-index | Speed Index shows how quickly the contents of a page are visibly populated | 15 | airbnb, aliexpress, ebay, facebook, github, linkedin, medium, netflix, pinterest, quora, reddit, twitch, twitter, walmart, youtube | 100.0 |
| 3 | total-blocking-time | Sum of all time periods between FCP and Time to Interactive, when task length exceeded 50ms, expressed in milliseconds | 15 | airbnb, aliexpress, ebay, facebook, github, linkedin, medium, netflix, pinterest, quora, reddit, twitch, twitter, walmart, youtube | 100.0 |
| 4 | max-potential-fid | The maximum potential First Input Delay that your users could experience is the duration of the longest task | 15 | airbnb, aliexpress, ebay, facebook, github, linkedin, medium, netflix, pinterest, quora, reddit, twitch, twitter, walmart, youtube | 100.0 |
| 5 | interactive | Time to Interactive is the amount of time it takes for the page to become fully interactive | 15 | airbnb, aliexpress, ebay, facebook, github, linkedin, medium, netflix, pinterest, quora, reddit, twitch, twitter, walmart, youtube | 100.0 |
| 6 | unused-javascript | Reduce unused JavaScript and defer loading scripts until they are required to decrease bytes consumed by network activity | 15 | airbnb, aliexpress, ebay, facebook, github, linkedin, medium, netflix, pinterest, quora, reddit, twitch, twitter, walmart, youtube | 100.0 |
| 7 | largest-contentful-paint-element | This is the largest contentful element painted within the viewport | 14 | airbnb, aliexpress, ebay, facebook, github, linkedin, netflix, pinterest, quora, reddit, twitch, twitter, walmart, youtube | 93.33 |
| 8 | largest-contentful-paint | Largest Contentful Paint marks the time at which the largest text or image is painted | 14 | airbnb, aliexpress, ebay, facebook, github, linkedin, netflix, pinterest, quora, reddit, twitch, twitter, walmart, youtube | 93.33 |
| Continued on next page | | | | | |

| S/N | Audit Name | Audit Description | Count | Websites | Coverage |
|------------------------|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------|-------|---------------------------------------------------------------------------------------------------------------------------|----------|
| 9 | errors-in-console | Errors logged to the console indicate unresolved problems | 14 | airbnb, aliexpress, ebay, facebook, github, linkedin, medium, pinterest, quora, reddit, twitch, twitter, walmart, youtube | 93.33 |
| 10 | uses-text-compression | Text-based resources should be served with compression (gzip, deflate or brotli) to minimize total network bytes | 14 | airbnb, aliexpress, ebay, facebook, github, linkedin, medium, netflix, pinterest, quora, reddit, twitch, walmart, youtube | 93.33 |
| 11 | legacy-javascript | Polyfills and transforms enable legacy browsers to use new JavaScript features | 13 | airbnb, aliexpress, ebay, facebook, linkedin, medium, netflix, pinterest, quora, twitch, twitter, walmart, youtube | 86.67 |
| 12 | third-party-summary | Third-party code can significantly impact load performance | 13 | airbnb, aliexpress, ebay, github, linkedin, medium, netflix, pinterest, quora, reddit, twitch, walmart, youtube | 86.67 |
| 13 | mainthread-work-breakdown | Consider reducing the time spent parsing, compiling and executing JS | 12 | airbnb, aliexpress, ebay, github, linkedin, medium, netflix, pinterest, reddit, twitch, walmart, youtube | 80.0 |
| 14 | bootup-time | Consider reducing the time spent parsing, compiling, and executing JS | 11 | aliexpress, ebay, github, linkedin, medium, netflix, pinterest, reddit, twitch, walmart, youtube | 73.33 |
| 15 | unused-css-rules | Reduce unused rules from stylesheets and defer CSS not used for above-the-fold content to decrease bytes consumed by network activity | 11 | airbnb, aliexpress, ebay, github, linkedin, netflix, pinterest, quora, reddit, walmart, youtube | 73.33 |
| 16 | inspector-issues | Issues logged to the 'Issues' panel in Chrome Devtools indicate unresolved problems | 10 | airbnb, aliexpress, ebay, linkedin, medium, netflix, twitch, twitter, walmart, youtube | 66.67 |
| 17 | render-blocking-resources | Resources are blocking the first paint of your page | 9 | airbnb, ebay, facebook, github, linkedin, medium, netflix, reddit, youtube | 60.0 |
| 18 | uses-long-cache-ttl | A long cache lifetime can speed up repeat visits to your page | 9 | aliexpress, ebay, linkedin, medium, netflix, pinterest, reddit, twitch, walmart | 60.0 |
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| S/N | Audit Name | Audit Description | Count | Websites | Coverage |
|------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|-------|-----------------------------------------------------------------|----------|
| 19 | third-party-cookies | Support for third-party cookies will be removed in a future version of Chrome | 7 | aliexpress, ebay, linkedin, medium, twitch, twitter, walmart | 46.67 |
| 20 | deprecations | Deprecated APIs will eventually be removed from the browser | 7 | aliexpress, ebay, facebook, pinterest, twitch, walmart, youtube | 46.67 |
| 21 | uses-responsive-images | Serve images that are appropriately-sized to save cellular data and improve load time | 7 | aliexpress, ebay, github, pinterest, reddit, twitch, walmart | 46.67 |
| 22 | dom-size | A large DOM will increase memory usage, cause longer [style calculations](https://developers | 7 | airbnb, aliexpress, ebay, github, pinterest, reddit, youtube | 46.67 |
| 23 | is-on-https | All sites should be protected with HTTPS, even ones that don't handle sensitive data | 7 | aliexpress, ebay, linkedin, medium, quora, walmart, youtube | 46.67 |
| 24 | target-size | Touch targets with sufficient size and spacing help users who may have difficulty targeting small controls to activate the targets | 6 | ebay, facebook, github, pinterest, reddit, twitter | 40.0 |
| 25 | modern-image-formats | Image formats like WebP and AVIF often provide better compression than PNG or JPEG, which means faster downloads and less data consumption | 6 | ebay, github, linkedin, pinterest, reddit, twitch | 40.0 |
| 26 | offscreen-images | Consider lazy-loading offscreen and hidden images after all critical resources have finished loading to lower time to interactive | 6 | aliexpress, ebay, github, linkedin, netflix, pinterest | 40.0 |
| 27 | unsized-images | Set an explicit width and height on image elements to reduce layout shifts and improve CLS | 6 | aliexpress, ebay, facebook, github, quora, twitch | 40.0 |
| 28 | cumulative-layout-shift | Cumulative Layout Shift measures the movement of visible elements within the viewport | 6 | aliexpress, ebay, github, pinterest, twitch, walmart | 40.0 |
| 29 | color-contrast | Low-contrast text is difficult or impossible for many users to read | 5 | aliexpress, ebay, facebook, medium, twitter | 33.33 |
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| S/N | Audit Name | Audit Description | Count | Websites | Coverage |
|-----|------------------------------|-----------------------------------------------------------------------------------------------------------------------|-------|----------------------------------------------|----------|
| 30 | font-display | Leverage the ‘font-display’ CSS feature to ensure text is user-visible while webfonts are loading | 5 | netflix, pinterest, reddit, twitch, twitter | 33.33 |
| 31 | font-size | Font sizes less than 12px are too small to be legible and require mobile visitors to “pinch to zoom” in order to read | 5 | facebook, netflix, quora, twitch, youtube | 33.33 |
| 32 | uses-passive-event-listeners | Consider marking your touch and wheel event listeners as ‘passive’ to improve your page’s scroll performance | 5 | linkedin, pinterest, reddit, twitch, youtube | 33.33 |
| 33 | total-byte-weight | Large network payloads cost users real money and are highly correlated with long load times | 5 | aliexpress, ebay, github, pinterest, youtube | 33.33 |