## A Appendix A: Prompt Design

```
1280
                   You are a web performance expert.
                  Based on the following Lighthouse audit:
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                  "{audit_issues}"
1283
1284
                  Due to the huge token size of HTML files,
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                   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.
1286
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                  1. Remember the code is split into chunks and you are only receiving one chunk at a time, there might be some losed or cut elements, do not worry about that.
1289
                  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.
1291
                   4. DO NOT modify class names
                  5. DO NOT remove any comments already in the code.
1292
                  6. DO NOT change any styles or functionalities of the code.
1293
                      DO NOT change the structure of the code.
1294
                  8. DO NOT change the order of the code.
9. DO NOT remove critical elements.
1295
                       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 ots/things resolved}} -->` at the end of the changed portion.
1297
              elements/things resolved}}
1298
              Do not indicate any resolution outside of the End of Optimization comment, where there are multiple resolutions being made, seperate them with commas within the End of optimization comment.
1299
                   11. Return the modified HTML code alone, making only necessary changes for performance optimization.
1300
                  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.
1301
1302
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                  The original HTML code is as follows:
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                  ···html
1305
                  \{html\_part\}
1306
                  ....
1307
1308
1309
```

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	15	airbnb, aliexpress,	100.0	
		marks the time at which		ebay, facebook, github,		
		the first text or image is		linkedin, medium,		
		painted		netflix, pinterest, quora,		
				reddit, twitch, twitter,		
				walmart, youtube		
2	speed-index	Speed Index shows how	15	airbnb, aliexpress,	100.0	
		quickly the contents of		ebay, facebook, github,		
		a page are visibly popu-		linkedin, medium,		
		lated		netflix, pinterest, quora,		
				reddit, twitch, twitter,		
				walmart, youtube		
3	total-blocking-time	Sum of all time periods	15	airbnb, aliexpress,	100.0	
		between FCP and Time		ebay, facebook, github,		
		to Interactive, when		linkedin, medium,		
		task length exceeded		netflix, pinterest, quora,		
		50ms, expressed in		reddit, twitch, twitter,		
		milliseconds		walmart, youtube		
4	max-potential-fid	The maximum poten-	15	airbnb, aliexpress,	100.0	
		tial First Input Delay		ebay, facebook, github,		
		that your users could		linkedin, medium,		
		experience is the dura-		netflix, pinterest, quora,		
		tion of the longest task		reddit, twitch, twitter,		
				walmart, youtube		
5	interactive	Time to Interactive is	15	airbnb, aliexpress,	100.0	
		the amount of time it		ebay, facebook, github,		
		takes for the page to be-		linkedin, medium,		
		come fully interactive		netflix, pinterest, quora,		
				reddit, twitch, twitter,		
				walmart, youtube		
6	unused-javascript	Reduce unused	15	airbnb, aliexpress,	100.0	
		JavaScript and de-		ebay, facebook, github,		
		fer loading scripts until		linkedin, medium,		
		they are required to de-		netflix, pinterest, quora,		
		crease bytes consumed		reddit, twitch, twitter,		
		by network activity		walmart, youtube		
7	largest-contentful-	This is the largest con-	14	airbnb, aliexpress,	93.33	
	paint-element	tentful element painted		ebay, facebook, github,		
		within the viewport		linkedin, netflix, pin-		
				terest, quora, reddit,		
				twitch, twitter, walmart,		
_				youtube		
8	largest-contentful-	Largest Contentful	14	airbnb, aliexpress,	93.33	
	paint	Paint marks the time at		ebay, facebook, github,		
		which the largest text		linkedin, netflix, pin-		
		or image is painted		terest, quora, reddit,		
				twitch, twitter, walmart,		
				youtube		
Continued on next page						

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10	errors-in-console	Errors logged to the console indicate unre-	14	airbnb, aliexpress,	93.33
10		console indicate unre-			
10				ebay, facebook, github,	
10		solved problems		linkedin, medium,	
10				pinterest, quora, reddit,	
10				twitch, twitter, walmart,	
10		m . 1 1		youtube	
	uses-text-compression	Text-based resources	14	airbnb, aliexpress,	93.33
		should be served with		ebay, facebook, github, linkedin, medium,	
		compression (gzip, deflate or brotli) to		linkedin, medium, netflix, pinterest, quora,	
		minimize total network		reddit, twitch, walmart,	
		bytes		youtube	
11	legacy-javascript	Polyfills and transforms	13	airbnb, aliexpress, ebay,	86.67
11	regacy javaseript	enable legacy browsers	13	facebook, linkedin,	00.07
		to use new JavaScript		medium, netflix, pin-	
		features		terest, quora, twitch,	
		Teatares		twitter, walmart,	
				youtube	
12	third-party-summary	Third-party code can	13	airbnb, aliexpress,	86.67
	. , ,	significantly impact		ebay, github, linkedin,	
		load performance		medium, netflix, pin-	
				terest, quora, reddit,	
				twitch, walmart,	
				youtube	
13	mainthread-work-	Consider reducing	12	airbnb, aliexpress,	80.0
	breakdown	the time spent pars-		ebay, github, linkedin,	
		ing, compiling and		medium, netflix, pin-	
		executing JS		terest, reddit, twitch,	
1.4	1 ( )	0 11 1 1	11	walmart, youtube	70.00
14	bootup-time	Consider reducing	11	aliexpress, ebay, github, linkedin, medium,	73.33
		the time spent pars- ing, compiling, and		netflix, pinterest, red-	
		executing JS		dit, twitch, walmart,	
		executing jo		youtube	
15	unused-css-rules	Reduce unused rules	11	airbnb, aliexpress, ebay,	73.33
		from stylesheets and de-		github, linkedin, netflix,	,
		fer CSS not used for		pinterest, quora, reddit,	
		above-the-fold content		walmart, youtube	
		to decrease bytes con-			
		sumed by network ac-			
		tivity			
16	inspector-issues	Issues logged to the 'Is-	10	airbnb, aliexpress, ebay,	66.67
		sues' panel in Chrome		linkedin, medium, net-	
		Devtools indicate unre-		flix, twitch, twitter, wal-	
		solved problems		mart, youtube	
17	render-blocking-	Resources are blocking	9	airbnb, ebay, face-	60.0
	resources	the first paint of your		book, github, linkedin,	
		page		medium, netflix, reddit,	
10	11000 long o1 441	A lama and 1 : 1:f-1:	0	youtube	(0.0
18	uses-long-cache-ttl	A long cache lifetime	9	aliexpress, ebay,	60.0
		can speed up repeat vis-		linkedin, medium,	
		its to your page		netflix, pinterest, reddit, twitch, walmart	
				Continued o	

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S/N	Audit Name	Audit Description	Count	Websites	Coverage
19	third-party-cookies	Support for third-party	7	aliexpress, ebay,	46.67
		cookies will be removed		linkedin, medium,	
		in a future version of		twitch, twitter, walmart	
		Chrome			
20	deprecations	Deprecated APIs will	7	aliexpress, ebay, face-	46.67
		eventually be removed		book, pinterest, twitch,	
		from the browser		walmart, youtube	
21	uses-responsive-	Serve images that are	7	aliexpress, ebay, github,	46.67
	images	appropriately-sized to		pinterest, reddit, twitch,	
		save cellular data and		walmart	
		improve load time			
22	dom-size	A large DOM will	7	airbnb, aliexpress, ebay,	46.67
		increase mem-		github, pinterest, reddit,	
		ory usage, cause		youtube	
		longer [style calcula-		,	
		tions](https://developers			
23	is-on-https	All sites should be	7	aliexpress, ebay,	46.67
	is on maps	protected with HTTPS,	,	linkedin, medium,	10.07
		even ones that don't		quora, walmart,	
		handle sensitive data		youtube	
24	target-size	Touch targets with suf-	6	ebay, facebook, github,	40.0
	target size	ficient size and spac-	O	pinterest, reddit, twitter	10.0
		ing help users who may		pinterest, reddit, twitter	
		have difficulty targeting			
		small controls to acti-			
		vate the targets			
25	modern-image-formats	Image formats like	6	ebay, github, linkedin,	40.0
23	modern mage formats	WebP and AVIF often	U	pinterest, reddit, twitch	40.0
		provide better com-		phiterest, readit, twiter	
		pression than PNG or			
		IPEG, which means			
		faster downloads and			
		less data consumption			
26	offscreen-images	Consider lazy-loading	6	aliexpress, ebay, github,	40.0
20	offscreen-inages	offscreen and hidden	U	linkedin, netflix, pinter-	40.0
		images after all critical		est	
		resources have finished		est	
		loading to lower time to			
		loading to lower time to			
		"			
27	unsized-images	interactive	6	aliavarace show force	40.0
27	unsized-images	interactive Set an explicit width	6	aliexpress, ebay, face-	40.0
27	unsized-images	interactive  Set an explicit width and height on image el-	6	book, github, quora,	40.0
27	unsized-images	interactive  Set an explicit width and height on image elements to reduce layout	6		40.0
	C	interactive  Set an explicit width and height on image elements to reduce layout shifts and improve CLS		book, github, quora, twitch	
27	cumulative-layout-	interactive  Set an explicit width and height on image elements to reduce layout shifts and improve CLS  Cumulative Layout	6	book, github, quora, twitch	40.0
	C	interactive  Set an explicit width and height on image elements to reduce layout shifts and improve CLS  Cumulative Layout Shift measures the		book, github, quora, twitch  aliexpress, ebay, github, pinterest, twitch, wal-	
	cumulative-layout-	interactive  Set an explicit width and height on image elements to reduce layout shifts and improve CLS  Cumulative Layout Shift measures the movement of visible		book, github, quora, twitch	
	cumulative-layout-	interactive  Set an explicit width and height on image elements to reduce layout shifts and improve CLS  Cumulative Layout Shift measures the movement of visible elements within the		book, github, quora, twitch  aliexpress, ebay, github, pinterest, twitch, wal-	
28	cumulative-layout- shift	interactive  Set an explicit width and height on image elements to reduce layout shifts and improve CLS  Cumulative Layout Shift measures the movement of visible elements within the viewport	6	book, github, quora, twitch  aliexpress, ebay, github, pinterest, twitch, wal- mart	40.0
	cumulative-layout-	interactive  Set an explicit width and height on image elements to reduce layout shifts and improve CLS  Cumulative Layout Shift measures the movement of visible elements within the viewport  Low-contrast text is dif-		book, github, quora, twitch  aliexpress, ebay, github, pinterest, twitch, walmart  aliexpress, ebay, face-	
28	cumulative-layout- shift	interactive  Set an explicit width and height on image elements to reduce layout shifts and improve CLS  Cumulative Layout Shift measures the movement of visible elements within the viewport	6	book, github, quora, twitch  aliexpress, ebay, github, pinterest, twitch, wal- mart	40.0

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S/N	Audit Name	Audit Description	Count	Websites	Coverage
30	font-display	Leverage the 'font-	5	netflix, pinterest, reddit,	33.33
		display' CSS feature		twitch, twitter	
		to ensure text is user-			
		visible while webfonts			
		are loading			
31	font-size	Font sizes less than	5	facebook, netflix, quora,	33.33
		12px are too small to be		twitch, youtube	
		legible and require mo-			
		bile visitors to "pinch to			
		zoom" in order to read			
32	uses-passive-event-	Consider marking your	5	linkedin, pinterest, red-	33.33
	listeners	touch and wheel event		dit, twitch, youtube	
		listeners as 'passive' to			
		improve your page's			
		scroll performance			
33	total-byte-weight	Large network pay-	5	aliexpress, ebay, github,	33.33
		loads cost users real		pinterest, youtube	
		money and are highly			
		correlated with long			
		load times			