

USDS Regulatory Analysis Web Application

Project Documentation

By David Morris

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Introduction

Greetings. My name is David Morris.

I wish to thank the United States Digital Services for this exercise. As a full stack developer, I figured that for the sake of a quick turn around time, we should rely on springboot and hibernate for the backend with angular on the frontend.

Of course, I'm up to speed with agentic AI as a form of assistance and I continue to research deeper on that direction every day (via many resources such as deeplearning.ai, azure ai course, local meetups, etc), but I won't digress too much on that here.

To get warmed up, on the day I received the assignment (Friday) I just allowed Claude Sonnet 4 to do whatever it wanted just to see what kind of crazy hallucinations it'd come up with. That way I'd better understand where to direct my *actual human effort because wow do those hallucinations stack up!*

Given what time I had in my schedule over this weekend I took to better understand the [ecrf.gov](https://www.ecrf.gov) and it's [api instructions](#).

All that considered, let us just count what I did today here on Monday the 22nd since it's less of a prototype and I was able to have a clear schedule to put my full professional attention. If you're curious about the crazy pure hallucination version of my code, here's [the link to that repository](#), but consider [what's here](#) to be the real submission.

So, having started fresh at roughly 10 am as of the day of this writing, let's see how things went.

Started at 10 am.

J EcfrApiService.java 9+ J MockDataService.java J RegulationRelationshipService.java J RegulationRelationshipRepository.java J ConflictSeverity.java J RelationshipType.java J extractContentFromVersionerPart/JsonNode

backed > src > main > java > com > usds > regulations > service > J EcfrApiService.java > Language Support for Java(TM) by Red Hat > EcfrApiService > extractContentFromVersionerPart/JsonNode

25 public class EcfrApiService {

40

41 // =====

42 // MAIN DOWNLOAD METHODS (Database CRUD Operations)

43 // =====

44

45 /**

46 * Download and SAVE all regulations for a title to H2 Database (all available parts)

47 * CRUD: CREATE + UPDATE operations

48 */

49 public Map<String, Object> downloadAndSaveTitle(Integer titleNumber) {

50 logger.info(format:"Downloading and saving ALL available parts for CFR Title {}", titleNumber);

51 return downloadAndSaveTitle(titleNumber, Integer.MAX_VALUE); // Get all parts

52 }

53

54 /**

55 * Download and SAVE all regulations for a title to H2 Database (with sample size limit)

56 * CRUD: CREATE + UPDATE operations

57 */

58 public Map<String, Object> downloadAndSaveTitle(Integer titleNumber, Integer maxParts) {

59 logger.info(format:"Downloading and saving CFR Title {} to database (max {} parts)", titleNumber, maxParts);

60

61 Map<String, Object> result = new HashMap<>();

62 List<Regulation> downloadedRegulations = downloadTitleFromAPI(titleNumber, maxParts);

63

64 int created = 0, updated = 0, errors = 0;

65 List<Regulation> savedRegulations = new ArrayList<>();

66

67 for (Regulation regulation : downloadedRegulations) {

68 try {

69 // CHECK if exists in database

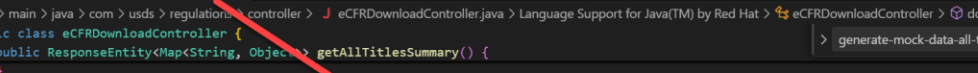
70 Optional<Regulation> existing = regulationRepository

71 .findByCfrTitleAndPartNumber(regulation.getCfrTitle(), regulation.getPartNumber());

72

73 if (existing.isPresent()) {

74 // UPDATE operation



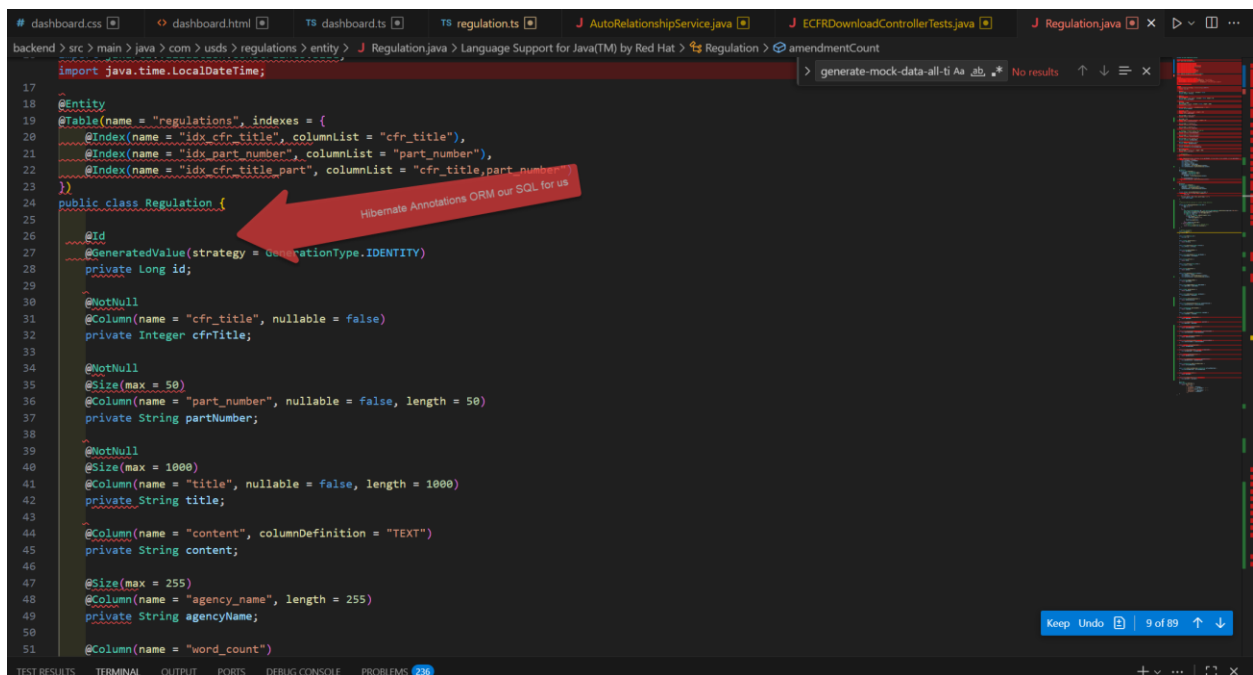
```
32 public class eCFRDownloadController {
273     public ResponseEntity<Map<String, Object>> getAllTitlesSummary() {
307     }
308
309     /**
310      * Download ALL CFR titles (1-50) with all available parts
311      * Endpoint: GET /api/eCFR_source-download-all-titles
312      */
313     @GetMapping("/eCFR_source-download-all-titles")
314     public ResponseEntity<Map<String, Object>> downloadAllTitles() {
315         logger.info(msg:"Bulk download endpoint called for ALL CFR titles (1-50) - all available parts");
316
317         Map<String, Object> response = new HashMap<>();
318         long startTime = System.currentTimeMillis();
319
320         try {
321             // ... (code continues) ...
322         }
323     }
324 }
```

I was very interested in this phase on how I could download and save tiles in any number of ways (hence method overloading), including how to do it in a manner wherein I can define a proper sample size. Afterall, downloading and pushing to a database where we have 50 titles and up to 200,000 documents could take hours of testing time and we certainly aren't interested in that!

The *ecfrApiService.java* class is called by our *eCFRDownloadController* to take these results and parse them into a database schema that I'm letting Hibernate annotations handle as *Entity* objects.

Schema Definitions - Hibernate

First model object was the *Regulations* object to capture everything we'd need for the core metric objectives.



```
# dashboard.css | dashboard.html | TS dashboard.ts | TS regulation.ts | J AutoRelationshipService.java | J ECFRDownloadControllerTests.java | J Regulation.java | ...
backend > src > main > java > com > usds > regulations > entity > J Regulation.java | Language Support for Java(TM) by Red Hat > Regulation > amendmentCount

import java.time.LocalDate;

17
18 @Entity
19 @Table(name = "regulations", indexes = {
20     @Index(name = "idx_cfr_title", columnList = "cfr_title"),
21     @Index(name = "idx_part_number", columnList = "part_number"),
22     @Index(name = "idx_cfr_title_part", columnList = "cfr_title,part_number")
23 })
24 public class Regulation {
25
26     @Id
27     @GeneratedValue(strategy = GenerationType.IDENTITY)
28     private Long id;
29
30     @NotNull
31     @Column(name = "cfr_title", nullable = false)
32     private Integer cfrTitle;
33
34     @NotNull
35     @Size(max = 50)
36     @Column(name = "part_number", nullable = false, length = 50)
37     private String partNumber;
38
39     @NotNull
40     @Size(max = 1000)
41     @Column(name = "title", nullable = false, length = 1000)
42     private String title;
43
44     @Column(name = "content", columnDefinition = "TEXT")
45     private String content;
46
47     @Size(max = 255)
48     @Column(name = "agency_name", length = 255)
49     private String agencyName;
50
51     @Column(name = "word_count")
```

AGENCY_NAME	AMENDMENT_COUNT	CFR_TITLE	CONTENT
General Services Administration	12	1	SECTION 1.1 GENERAL REQUIREMENTS This regulation establishes requirements for ensuring compliance with federal standards and promoting public safety. Covered entities must implement appropriate measures to meet regulatory objectives. SECTION 1.2 IMPLEMENTATION PROCEDURES Implementation must follow established procedures and timelines. Entities should develop internal procedures to ensure consistent application of regulatory requirements. SECTION 1.3 OVERSIGHT AND ENFORCEMENT Regular oversight activities verify compliance with regulatory requirements. Enforcement actions may be taken for violations, with penalties proportionate to the severity of non-compliance. Appeals processes are available for entities that disagree.
General Services Administration	10	1	SECTION 2.1 GENERAL REQUIREMENTS This regulation establishes requirements for ensuring compliance with federal standards and promoting public safety. Covered entities must implement appropriate measures to meet regulatory objectives. Appeals processes are available for entities that disagree. SECTION 2.2 IMPLEMENTATION PROCEDURES Implementation must follow established procedures and timelines. Entities should develop internal procedures to ensure consistent application of regulatory requirements. Regular training programs must be established to ensure personnel understand regulatory requirements. SECTION 2.3 OVERSIGHT AND ENFORCEMENT Regular oversight activities verify compliance with regulatory requirements. Enforcement actions may be taken for violations, with penalties proportionate to the severity of non-compliance. Exemptions may be available for certain circumstances.
General Services Administration	14	1	SECTION 3.1 GENERAL REQUIREMENTS This regulation establishes requirements for ensuring compliance with federal standards and promoting public safety. Covered entities must implement appropriate measures to meet regulatory objectives. Exemptions may be available for certain circumstances. SECTION 3.2 IMPLEMENTATION PROCEDURES Implementation must follow established procedures and timelines. Entities should develop internal procedures to ensure consistent application of regulatory requirements. Appeals processes are available for entities that disagree with regulatory requirements. SECTION 3.3 OVERSIGHT AND ENFORCEMENT Regular oversight activities verify compliance with regulatory requirements. Enforcement actions may be taken for violations, with penalties proportionate to the severity of non-compliance. SECTION 3.4 IMPLEMENTATION AND COMPLIANCE These regulations shall be implemented in accordance with established procedures. Compliance monitoring will be conducted through regular reviews and inspections. Non-compliance may result in enforcement actions as provided by law.
General Services Administration	8	1	SECTION 4.1 GENERAL REQUIREMENTS This regulation establishes requirements for ensuring compliance with federal standards and promoting public safety. Covered entities must implement appropriate measures to meet regulatory objectives. SECTION 4.2 IMPLEMENTATION PROCEDURES

Technical Debt: Grabbing Regulatory Content

Testing was slowed down as I was putting in these API calls in Postman only to be returned with anti-web scraping messages.

Keeps complaining of captcha challenge tests that are bad links

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46 <div class="text-right"></div>
47 </div>
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49 <div class="dialog">
50 <div>Request Access</div>
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Not really getting what we needed in terms of the WordCount service either. Checking with them and a WordCount service and other upcoming metrics. So, WordCount not needed to be an API endpoint for now.

SELECT * FROM REGULATIONS;	CFR_TITLE	CONTENT	CONTENT_CHECKSUM	CREATED_AT	PART_NUMBER	TITLE	UPDATED_AT	WORD_COUNT
1	General Services Administration	1	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:46 91894	1	CFR Part 1	2025-09-22 13:28:46 91894	6
2	General Services Administration	1	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:46 96666	2	CFR Part 2	2025-09-22 13:28:46 96666	6
3	General Services Administration	1	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:46 972874	3	CFR Part 3	2025-09-22 13:28:46 972874	6
4	General Services Administration	1	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:46 979907	4	CFR Part 4	2025-09-22 13:28:46 979907	6
5	General Services Administration	1	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:46 984423	5	CFR Part 5	2025-09-22 13:28:46 984423	6
6	Office of Management and Budget	2	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:50 880906	1	CFR Part 1	2025-09-22 13:28:50 880906	6
7	Office of Management and Budget	2	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:50 885413	2	CFR Part 2	2025-09-22 13:28:50 885413	6
8	Office of Management and Budget	2	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:50 889657	3	CFR Part 3	2025-09-22 13:28:50 889657	6
9	Office of Management and Budget	2	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:50 893361	4	CFR Part 4	2025-09-22 13:28:50 893361	6
10	Office of Management and Budget	2	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:50 901897	5	CFR Part 5	2025-09-22 13:28:50 901897	6
11	Executive Office of the President	3	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:54 959502	1	CFR Part 1	2025-09-22 13:28:54 959502	6
12	Executive Office of the President	3	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:54 964504	2	CFR Part 2	2025-09-22 13:28:54 964504	6
13	Executive Office of the President	3	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:54 968537	3	CFR Part 3	2025-09-22 13:28:54 968537	6
14	Executive Office of the President	3	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:54 975043	4	CFR Part 4	2025-09-22 13:28:54 975043	6
15	Executive Office of the President	3	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:54 980571	5	CFR Part 5	2025-09-22 13:28:54 980571	6
16	Government Accountability Office	4	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:59 1117	1	CFR Part 1	2025-09-22 13:28:59 1117	6
17	Government Accountability Office	4	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:59 119653	2	CFR Part 2	2025-09-22 13:28:59 119653	6
18	Government Accountability Office	4	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:59 12512	3	CFR Part 3	2025-09-22 13:28:59 12512	6
19	Government Accountability Office	4	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:59 130376	4	CFR Part 4	2025-09-22 13:28:59 130376	6
20	Government Accountability Office	4	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:28:59 136395	5	CFR Part 5	2025-09-22 13:28:59 136395	6
21	Office of Personnel Management	5	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:03 238705	1	CFR Part 1	2025-09-22 13:29:03 238705	6
22	Office of Personnel Management	5	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:03 243701	2	CFR Part 2	2025-09-22 13:29:03 243701	6
23	Office of Personnel Management	5	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:03 249727	3	CFR Part 3	2025-09-22 13:29:03 249727	6
24	Office of Personnel Management	5	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:03 255744	4	CFR Part 4	2025-09-22 13:29:03 255744	6
25	Office of Personnel Management	5	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:03 260779	5	CFR Part 5	2025-09-22 13:29:03 260779	6
26	Department of Homeland Security	6	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:07 087731	1	CFR Part 1	2025-09-22 13:29:07 087731	6
27	Department of Homeland Security	6	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:07 093732	2	CFR Part 2	2025-09-22 13:29:07 093732	6
28	Department of Homeland Security	6	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:07 098762	3	CFR Part 3	2025-09-22 13:29:07 098762	6
29	Department of Homeland Security	6	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:07 10376	4	CFR Part 4	2025-09-22 13:29:07 10376	6
30	Department of Homeland Security	6	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:07 109795	5	CFR Part 5	2025-09-22 13:29:07 109795	6
31	Department of Agriculture	7	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:12 249906	1	CFR Part 1	2025-09-22 13:29:12 249906	6
32	Department of Agriculture	7	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:12 25633	2	CFR Part 2	2025-09-22 13:29:12 25633	6
33	Department of Agriculture	7	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:12 261941	3	CFR Part 3	2025-09-22 13:29:12 261941	6
34	Department of Agriculture	7	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:12 26717	4	CFR Part 4	2025-09-22 13:29:12 26717	6
35	Department of Agriculture	7	Content not available from search results b370055319d4e0f35b8c85496b737811f59b4405c0ebda59517698076	2025-09-22 13:29:12 273206	5	CFR Part 5	2025-09-22 13:29:12 273206	6

Seems the instructions on the api from ecfr.gov were vague and unclear. The proper url request needed to be something along the lines of <https://ecfr.federalregister.gov/api/>, and even after making that discovery, it was unclear how I would populate my database with proper content so I could run a WordCount service over them.

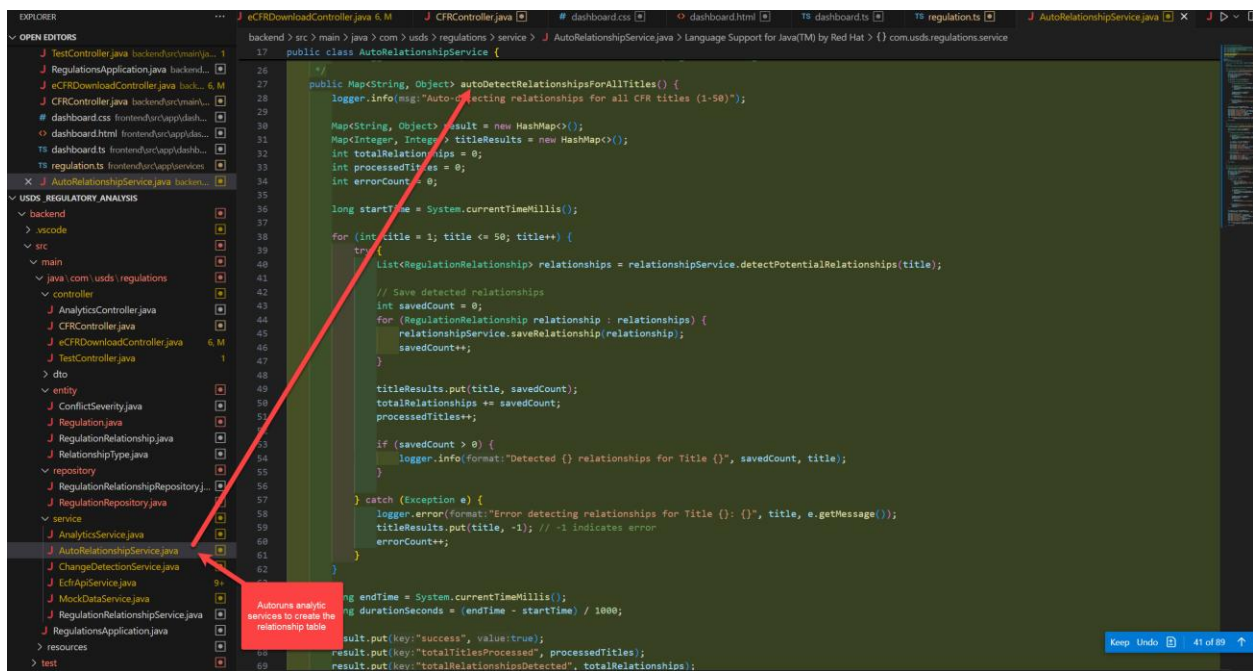
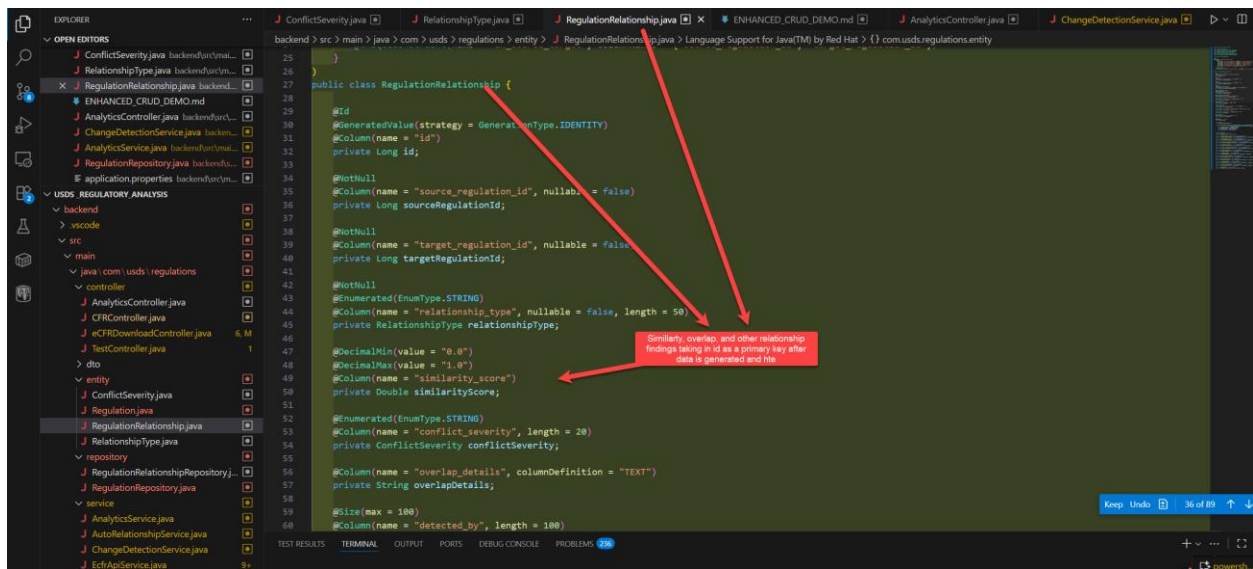
Ultimately, I decided to mock this missing data under MockDataService. For now, just invoke `POST http://localhost:8081/api/generate-mock-data-all-titles-with-relationships/5` to create mock data as a placeholder wherein other services may assume that we not only pulled live metadata correctly, but also content such as what you'd find [here](#). \

Further Metric Considerations

The assignment calls for **word count**, **historical changes over time**, and a **checksum** per agency but also asks that I consider metrics of my own.

Personally, I've always been interested in redundancy ever since I discovered how many regulations might be hitting the same thing years ago, so I ensured my mock data had the potential for overlap before forming a *RegulationRelationship* table that'd do some quick analysis on where we might have such redundancy, with differing scores. So within my mock data my goal was to create fake regulations with differing fake relationships.

A long term new feature would be AI generated sentiment analysis to review and check for redundancy in the form of a database agent, but such would require API keys and what have you, so it's simply rule based for now, with different assessment levels. This would be a full scoped feature involving a database agent and AI Management Architecture (such as [here](#)) that checks for content and looks for titles that overlap with each other.



Run Run Selected Auto complete Clear SQL statement

SELECT * FROM REGULATION_RELATIONSHIPS

ID	CONFLICT_SEVERITY	DETECTED_AT	DETECTED_BY	IS_CONFIRMED	OVERLAP_DETAILS	RELATIONSHIP_TYPE	REVIEW_NOTES	SIMILARITY_SCORE	SOURCE_REGULATION_ID	TARGET_REGULATION_ID	UPDATED_AT
1	null	2025-09-22 16:43:50.467708	BASIC_SIMILARITY_ANALYSIS	FALSE	High content similarity detected (0.74). Regulations may be redundant.	REDUNDANT	null	0.7362637362637363	31	34	2025-09-22 16:43:50.46770
2	null	2025-09-22 16:43:50.476246	BASIC_SIMILARITY_ANALYSIS	FALSE	High content similarity detected (0.81). Regulations may be redundant.	REDUNDANT	null	0.8095238095238095	32	35	2025-09-22 16:43:50.47624
3	null	2025-09-22 16:43:50.47976	BASIC_SIMILARITY_ANALYSIS	FALSE	High content similarity detected (0.77). Regulations may be redundant.	REDUNDANT	null	0.7714285714285715	34	35	2025-09-22 16:43:50.47976

(3 rows, 2 ms)

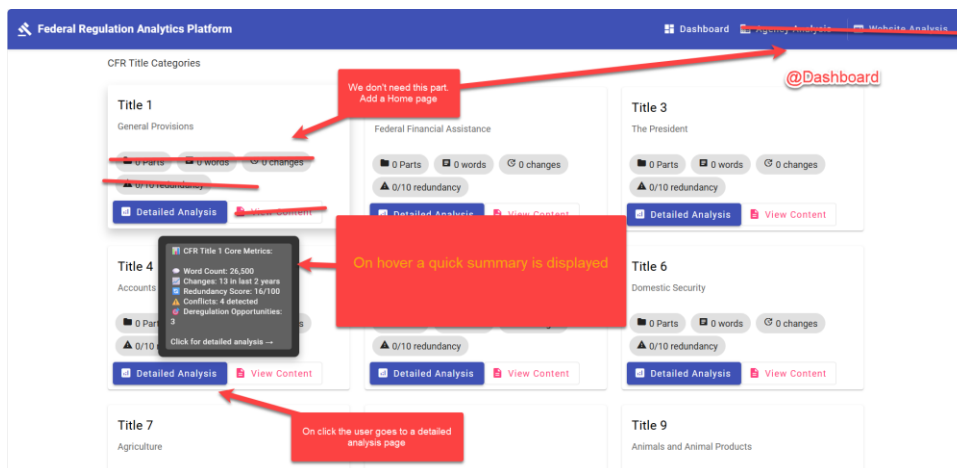
Edit

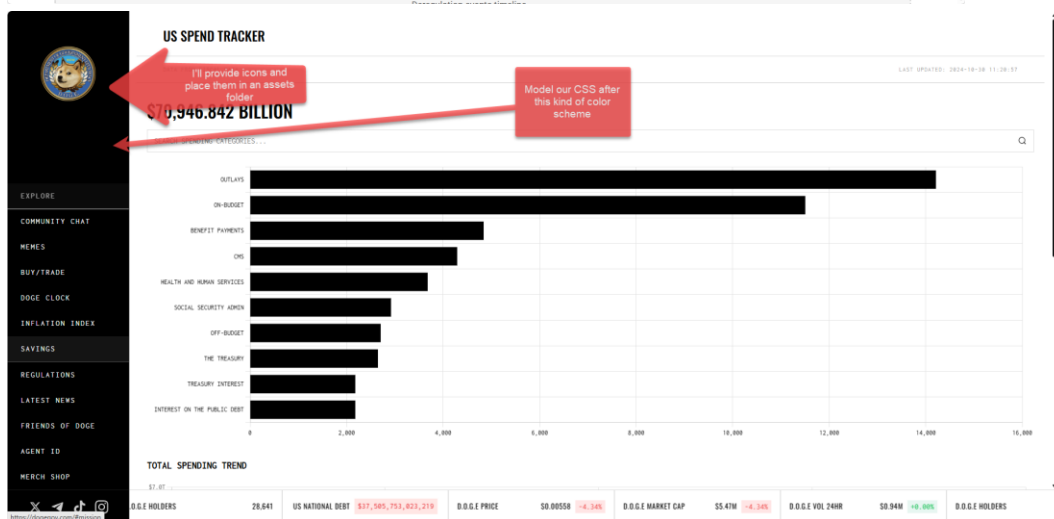
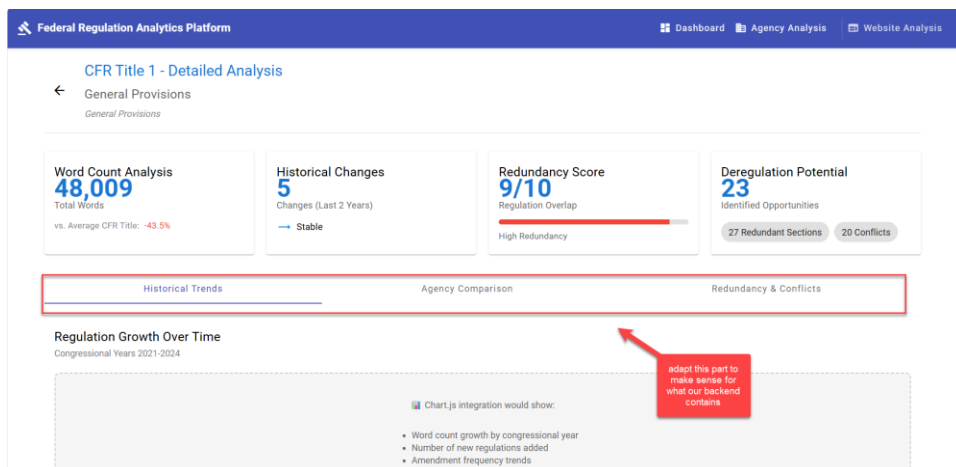
Frontend

This part started around 4:30 pm roughly. It started by first looking at what DOGE websites already use for a color scheme and doing my best to imitate it.

The frontend was more straightforward. Much of it I was able to allow Claude to gin up because I chiefly dedicated my *human effort* into creating visual guides, mock ups, and pseudo whiteboards for it (Take for instance a few SNAGIT examples I wanted to still retain from the warmup activity from Friday).

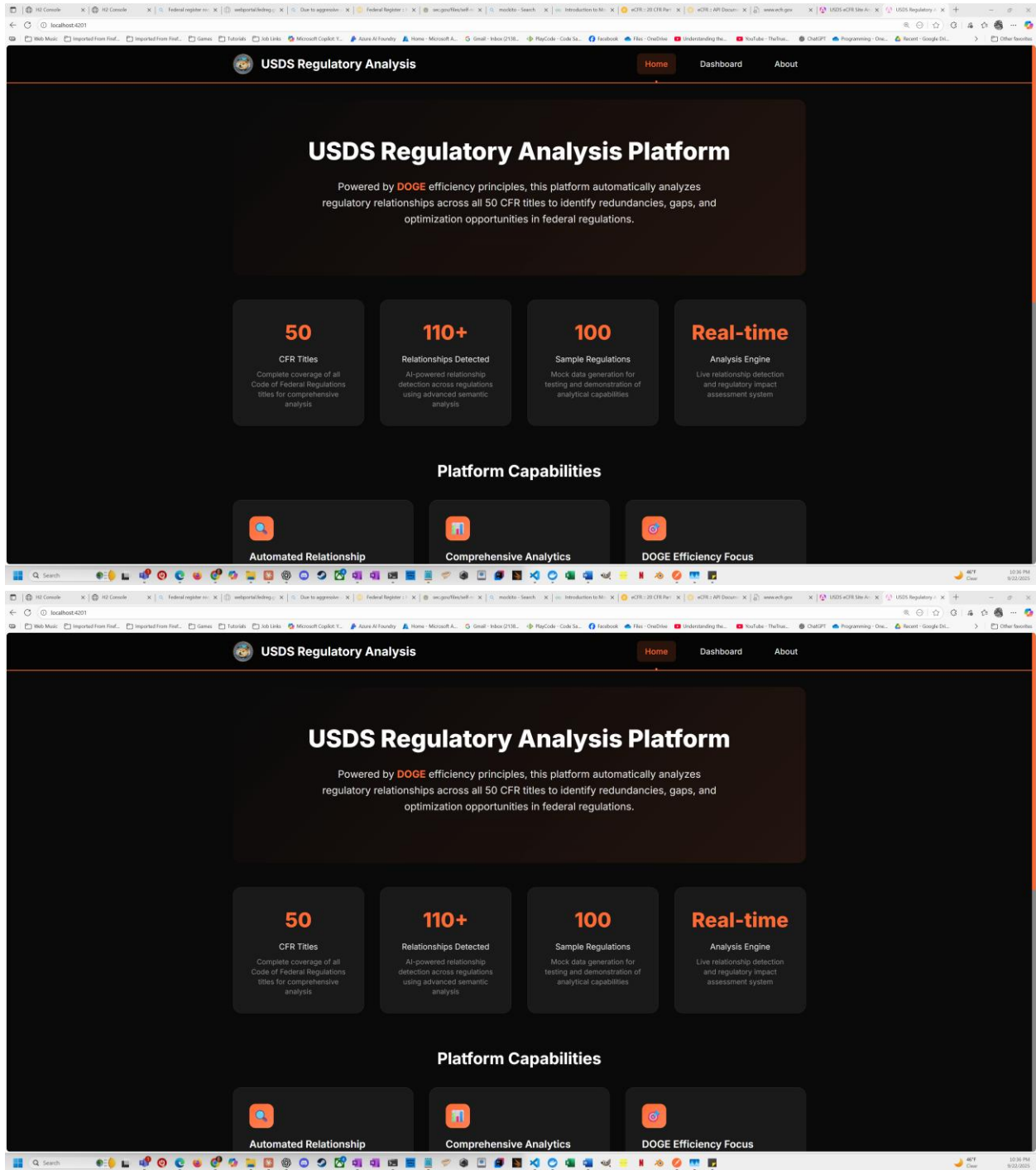
Sample Training Mockups

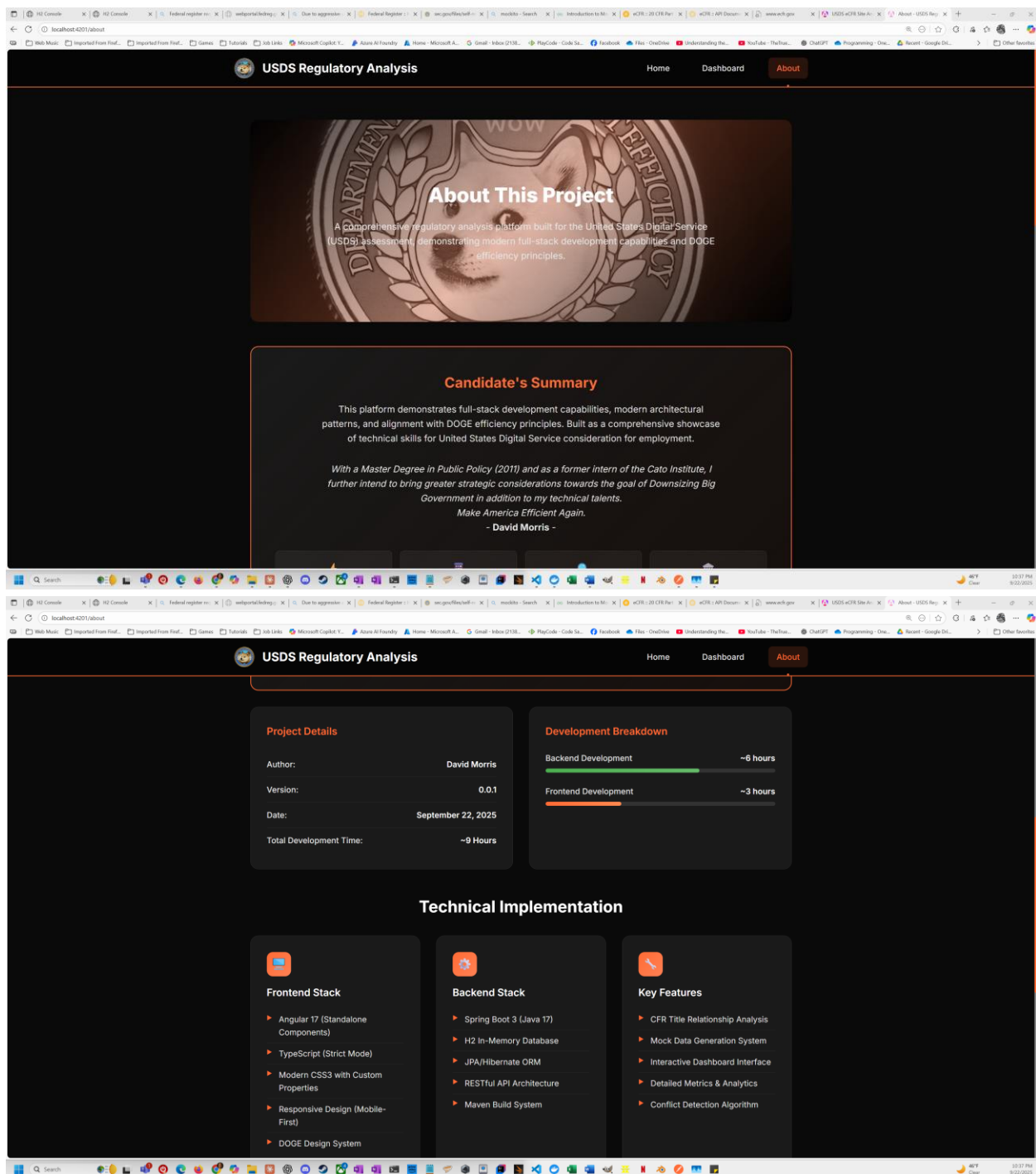




By being visual training-data oriented, I could afford to spend more time making sure the minimum viable product looks good and professional.

Final User Interface Screenshots





With time to spare, I put a considerable amount of *human effort* into the About page you'll find. Please check it out, for it contains a personal final message from me, as well as the time summary on this effort.

Roughly done by 7:30 pm. Then about an hour was spent writing this rough documentation. Naturally you'll see some extra cleaned up technical documentation in the longer run, but hopefully this, along with the READMEs and the website itself, will suffice.

Conclusion

I appreciate USDS for considering me as a candidate to join the team as a developer. I look forward to contributing to improved efficiency. Let's Make America Efficient Again!

Sincerely,

-David Noble Morris