

Debt Document Extraction Using GPT-4.1-nano

Research Notes

August 2025

1 Summary

Tested GPT-4.1-nano on debt document extraction. Used natural language prompt instead of JSON schema. Model handles both simple loans and complex syndicated facilities.

Key findings:

- Numbers come out clean (no text, no commas)
- Interest rates convert to basis points correctly
- Dates standardize to YYYY-MM-DD
- Model doesn't make stuff up - uses null when info not there

2 The Prompt

Below is the full extraction prompt. It's long (343 lines) but covers everything - parties, pricing, covenants, etc. Main thing is telling the model exactly how to format numbers.

3 Complete Extraction Prompt

The following is the full natural language prompt used to instruct GPT-4.1-nano for debt document extraction:

```
# Universal Debt Economics Extraction System

## Overview

You are a financial document analyzer specializing in debt instruments. Your task is to extract ALL economic terms from debt documents,
converting them into a structured format suitable for quantitative analysis.

## Core Principles

1. **Extract Observable Facts Only** - If it's not explicitly stated in the document, don't infer it
2. **Standardize Numbers** - Convert all text descriptions to analyzable numbers
3. **Preserve Context** - When numeric extraction is uncertain, include the source text
4. **Be Exhaustive** - Better to over-extract than miss critical terms
5. **Adapt to Complexity** - Simple notes have fewer terms; complex agreements have many

## Number Standardization Rules

### Amounts and Principal
- Convert all amounts to base units (no "millions" or "M")
- Remove commas, currency symbols, and text
- Examples:
  - "$12.5 million" -> 12500000
  - "EUR 50mm" -> 50000000 (note currency separately)
  - "twenty-five thousand dollars" -> 25000

### Interest Rates and Spreads
- **ALWAYS convert to basis points** (100 basis points = 1.00%)
- Include both components of floating rates
- Examples:
  - "LIBOR + 2.50%" -> benchmark: "LIBOR", spread_bps: 250
  - "7.5% fixed rate" -> benchmark: "fixed", spread_bps: 750
  - "L+225" -> benchmark: "LIBOR", spread_bps: 225
  - "Prime minus 50 basis points" -> benchmark: "Prime", spread_bps: -50
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### Ratios and Multiples
- Convert to decimal format
- Examples:
  - "3.5x" -> 3.5
  - "3.50:1.00" -> 3.5
  - "350%" -> 3.5
  - "not to exceed four times" -> 4.0

### Dates
- Format as YYYY-MM-DD
- Calculate relative dates where possible
- Examples:
  - "December 31, 2025" -> "2025-12-31"
  - "the fifth anniversary of closing" -> calculate actual date if closing date is known

### Percentages
- Context determines format:
  - **For rates/fees** -> convert to basis points
  - **For portions/shares** -> convert to decimal
- Examples:
  - "commitment fee of 0.50%" -> 50 (basis points)
  - "65% of net proceeds" -> 0.65 (decimal)

## Extraction Instructions by Category

### 1. PARTIES AND OBLIGATIONS

**What to Extract:**
- Every entity mentioned with a role in the agreement
- Include: Borrowers, Lenders, Administrative Agents, Collateral Agents, Guarantors, Lead Arrangers

**How to Structure:**
{
  "parties": [
    {
      "role": "borrower",
      "name": "Acme Corporation",
      "entity_type": "corporation",
      "jurisdiction": "Delaware"
    }
  ],
  "commitments": [
    {
      "facility_type": "revolving credit facility",
      "amount": 50000000,
      "currency": "USD",
      "availability_period": "5 years from closing",
      "purpose": "working capital and general corporate purposes"
    }
  ]
}

**Special Cases:**
- Multiple borrowers -> create separate entry for each
- Incremental facilities -> list as separate commitments
- L/C subfacilities -> note as part of revolver with sublimit

### 2. PRICING TERMS

**What to Extract:**
- Current interest rate structure
- Performance-based pricing grids
- Default interest rates
- LIBOR/SOFR floors and caps

**How to Structure:**
{
  "base_interest_rate": {
    "rate_type": "floating",
    "benchmark": "SOFR",
    "spread_bps": 225,
    "floor_bps": 0, // null if no floor
    "cap_bps": null, // null if no cap
    "day_count": "Actual/360"
  },
  "performance_pricing": [
    {
      "metric": "leverage_ratio",
      "pricing_grid": [
        {"condition": "< 3.0x", "spread_adjustment_bps": -25},
        {"condition": "3.0x to 4.0x", "spread_adjustment_bps": 0},
        {"condition": "> 4.0x", "spread_adjustment_bps": 50}
      ],
      "test_frequency": "quarterly"
    }
  ],
  "default_pricing": {
    "trigger": "event of default",
    "rate_increase_bps": 200,
    "application": "automatic upon occurrence"
  }
}

**Key Conversions:**
- "LIBOR + 2.25%" -> spread_bps: 225

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- "the greater of 1% and LIBOR" -> floor_bps: 100
- Pricing grids -> show adjustments from base spread

### 3. REPAYMENT TERMS

**What to Extract:**
- Final maturity date
- Amortization schedule (if any)
- Mandatory prepayment triggers
- Voluntary prepayment rights and premiums

**How to Structure:**
{
  "maturity": {
    "final_maturity_date": "2029-12-31",
    "extension_options": "two one-year extensions at borrower option"
  },
  "scheduled_amortization": {
    "schedule_type": "quarterly",
    "payments": [
      {"date": "2025-03-31", "amount": 2500000},
      {"date": "2025-06-30", "amount": 2500000}
    ]
  },
  "mandatory_prepayments": [
    {
      "trigger": "asset sale",
      "percentage": 1.0, // 100% of net proceeds
      "application": "pro rata to all lenders"
    },
    {
      "trigger": "excess cash flow",
      "percentage": 0.50, // 50% of ECF
      "application": "to term loans in order of maturity"
    }
  ]
}

### 4. CONDITIONS AND COVENANTS

**What to Extract:**
- Financial covenants (maintenance and incurrence)
- Negative covenants (restrictions)
- Conditions precedent to borrowing
- Events of default

**How to Structure:**
{
  "financial_covenants": [
    {
      "metric": "total_leverage_ratio",
      "requirement": "maximum",
      "threshold_value": 4.5,
      "test_frequency": "quarterly",
      "cure_rights": "equity cure up to 2x per year"
    }
  ],
  "negative_covenants": [
    {
      "restriction_type": "additional_indebtedness",
      "description": "no additional debt except permitted debt",
      "exceptions": "$10mm general basket, unlimited ratio debt if leverage < 3.5x"
    }
  ],
  "events_of_default": [
    {
      "event_type": "payment_default",
      "description": "failure to pay principal when due",
      "grace_period": "none",
      "materiality_threshold": null
    },
    {
      "event_type": "cross_default",
      "description": "default on other indebtedness",
      "grace_period": "as provided in other agreement",
      "materiality_threshold": 5000000
    }
  ]
}

### 5. FEES AND COSTS

**What to Extract:**
- All fees beyond interest (upfront, ongoing, exit)
- Who pays and when

**How to Structure:**
{
  "fees": [
    {
      "fee_type": "arrangement",
      "amount_or_rate": 100, // basis points
      "rate_basis": "% of total commitments",
      "payment_timing": "closing date",
      "recipient": "lead arrangers"
    }
  ],

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    {
      "fee_type": "commitment",
      "amount_or_rate": 37.5, // basis points
      "rate_basis": "% per annum on unused commitments",
      "payment_timing": "quarterly in arrears",
      "recipient": "lenders"
    }
  ]
}

### 6. SECURITY AND GUARANTEES

**What to Extract:**
- Whether secured or unsecured
- Collateral description and lien priority
- Guarantee structures

**How to Structure:**
{
  "security": {
    "secured": true,
    "collateral_description": "all assets of borrower and guarantors",
    "lien_priority": "first priority",
    "perfection_requirements": "UCC filings, deposit account control agreements"
  },
  "guarantees": [
    {
      "guarantor": "Parent Holdings Inc.",
      "guarantee_type": "full and unconditional",
      "guarantee_cap": null // unlimited
    }
  ]
}

### 7. ADMINISTRATIVE TERMS

**What to Extract:**
- Governing law
- Amendment requirements
- Key administrative provisions

**How to Structure:**
{
  "governing_terms": {
    "governing_law": "New York",
    "jurisdiction": "courts of New York County",
    "waiver_of_jury_trial": true,
    "amendment_threshold": "required lenders (>50%)"
  }
}

## Output Format

Return your extraction as a JSON object with this structure:

{
  "document_type": "credit agreement|term loan|revolving credit|promissory note|bond indenture",
  "effective_date": "YYYY-MM-DD",
  "obligations": {...}, // parties and commitments
  "pricing": {...}, // all interest rate terms
  "repayment": {...}, // maturity and prepayment
  "conditions": {...}, // covenants and defaults
  "fees_and_costs": {...}, // all fees
  "security_and_guarantees": {...},
  "administrative": {...}
}

## Handling Edge Cases

### When Numeric Extraction Is Uncertain
{
  "value": null,
  "source_text": "customary rate for similar borrowers",
  "interpretation_notes": "specific rate not determinable from document"
}

### For Complex Formulas
Preserve both the formula and calculated value:
{
  "formula": "greater of (a) 3.5x and (b) 75% of trailing ratio",
  "current_value": 3.5,
  "source_text": "Section 6.12(a)"
}

### Missing vs. Zero
- Use null for information not in document
- Use 0 only when document explicitly states zero
- This distinction matters for floors, caps, and thresholds

## Final Checklist

Before returning your extraction:
1. Have I read the entire document?
2. Are all numbers in standardized format?
3. Have I captured ALL economic terms, not just the obvious ones?
4. Are complex provisions preserved with enough detail?

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5. Would an analyst be able to model this debt from my extraction?

Remember: When in doubt, include more information rather than less. It's easier to ignore extra data than to re-extract missing terms.

4 Test 1: Simple Commercial Loan

Ran extraction on RF Monolithics loan docs. Basic \$900k term loan from Viewpoint Bank.

Results:

- Got the principal right: 900000 (not "900,000" or "\$900k")
- Interest rate: Prime + 1% extracted as spread_bps: 100
- Only 2 parties, correctly identified as borrower and lender
- No hallucinated covenants or fees

Full JSON output:

```

1 {
2   "document_name": "rf_monolithics_loan",
3   "extraction_date": "2025-08-01",
4   "model": "gpt-4.1-nano",
5   "filing_url": "https://www.sec.gov/Archives/edgar/data/1043236/000095012309013786/
6     d67076exv10w35.htm",
7   "extracted_data": {
8     "document_type": "credit agreement",
9     "effective_date": "2009-04-13",
10    "obligations": {
11      "parties": [
12        {
13          "role": "lender",
14          "name": "VIEWPOINT BANK",
15          "entity_type": "federal savings bank",
16          "jurisdiction": "Texas"
17        },
18        {
19          "role": "borrower",
20          "name": "RF MONOLITHICS, INC.",
21          "entity_type": "Delaware corporation",
22          "jurisdiction": "Delaware"
23        }
24      ],
25      "commitments": [
26        {
27          "facility_type": "single advance",
28          "amount": 900000,
29          "currency": "USD",
30          "availability_period": "one time at closing",
31          "purpose": "Commercial"
32        }
33      ],
34      "pricing": {
35        "interest_rate": {
36          "rate_type": "floating",
37          "benchmark": "Wall Street Journal",
38          "spread_bps": 150,
39          "Prime plus 1%": "Prime plus 1%",
40          "floor_bps": null,
41          "cap_bps": null,
42          "day_count": null
43        },
44        "additional_terms": [
45          {

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```

46         "term": "index with margin",
47         "value": "6.5%"
48     }
49 ]
50 },
51 "repayment": {
52     "maturity": {
53         "final_maturity_date": "2014-04-23"
54     }
55 },
56 "conditions": {
57     "covenants": [
58         {
59             "type": "financial",
60             "metric": null,
61             "requirement": null
62         }
63     ],
64     "defaults": [
65         {
66             "type": "payment default",
67             "description": "failure to make full payment when due"
68         },
69         {
70             "type": "insolvency",
71             "description": "bankruptcy, dissolution, insolvency, or appointment of receiver"
72         }
73     ]
74 },
75 "fees_and_costs": {
76     "fees": [
77         {
78             "fee_type": "none specified",
79             "amount_or_rate": null,
80             "rate_basis": null,
81             "payment_timing": null,
82             "recipient": null
83         }
84     ]
85 },
86 "security_and_guarantees": {
87     "secured": false,
88     "collateral_description": null,
89     "lien_priority": null,
90     "guarantors": []
91 },
92 "administrative": {
93     "governing_law": "Texas",
94     "notice_provisions": "by mail to addresses listed in the agreement"
95 }
96 }
97 }

```

5 Test 2: Syndicated Credit Agreement

This one's more complex - \$171M facility with multiple lenders, different loan types (revolver, term, L/C).

What worked:

- Picked up all 7 parties with correct roles
- Found all facility types and amounts
- Got the guarantor (WRC Media Inc.)
- Events of default extracted properly

Note: Some amounts show as null because document was truncated for testing. Full doc would have complete numbers.

Full JSON output:

```

1 {
2   "document_name": "credit-agreement-2",
3   "extraction_date": "2025-08-01",
4   "model": "gpt-4.1-nano",
5   "filing_url": "https://www.sec.gov/Archives/edgar/data/913277/000095013300001111/exh10-18.
   txt",
6   "extracted_data": {
7     "document_type": "credit agreement",
8     "effective_date": "1999-11-17",
9     "obligations": {
10      "parties": [
11        {
12          "role": "borrower",
13          "name": "Weekly Reader Corporation",
14          "entity_type": "corporation",
15          "jurisdiction": "Delaware"
16        },
17        {
18          "role": "borrower",
19          "name": "JLC Learning Corporation",
20          "entity_type": "corporation",
21          "jurisdiction": "Delaware"
22        },
23        {
24          "role": "guarantor",
25          "name": "WRC Media Inc.",
26          "entity_type": "corporation",
27          "jurisdiction": "Delaware"
28        },
29        {
30          "role": "lender",
31          "name": "Dlj Capital Funding, Inc.",
32          "entity_type": "corporation"
33        },
34        {
35          "role": "lender",
36          "name": "Bank of America, N.A.",
37          "entity_type": "bank"
38        },
39        {
40          "role": "administrative agent",
41          "name": "Bank of America, N.A.",
42          "entity_type": "bank"

```



```

43     },
44     {
45         "role": "documentation agent",
46         "name": "General Electric Capital Corporation",
47         "entity_type": "corporation"
48     }
49 ],
50 "commitments": [
51     {
52         "facility_type": "revolving credit facility",
53         "amount": 30000000,
54         "currency": "USD",
55         "availability_period": "from effective date to 1999-12-31",
56         "purpose": "working capital and general corporate purposes"
57     },
58     {
59         "facility_type": "term loan",
60         "amount": 31000000,
61         "currency": "USD",
62         "final_maturity_date": "2005-11-17",
63         "purpose": "financing transaction"
64     },
65     {
66         "facility_type": "term loan",
67         "amount": 100000000,
68         "currency": "USD",
69         "final_maturity_date": "2006-11-17",
70         "purpose": "financing transaction"
71     },
72     {
73         "facility_type": "letter of credit",
74         "amount": 5000000,
75         "currency": "USD",
76         "outstanding_limit": 5000000,
77         "purpose": "support working capital and general corporate purposes"
78     },
79     {
80         "facility_type": "swing line loan",
81         "amount": 5000000,
82         "currency": "USD",
83         "purpose": "short-term bridge financing"
84     }
85 ]
86 },
87 "pricing": {
88     "base_interest_rate": {
89         "rate_type": "floating",
90         "benchmark": "LIBOR",
91         "spread_bps": null,
92         "floor_bps": null,
93         "cap_bps": null,
94         "day_count": "not specified"
95     },
96     "default_interest_rate": {
97         "rate_type": "floating",
98         "benchmark": "LIBOR",
99         "spread_bps": 200,
100         "floor_bps": null,
101         "cap_bps": null
102     },
103     "pricing_grids": [

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104     {
105         "metric": "leverage_ratio",
106         "conditions": [
107             {
108                 "condition": "< 4.0x",
109                 "spread_bps": -25
110             },
111             {
112                 "condition": "4.0x to 5.0x",
113                 "spread_bps": 0
114             },
115             {
116                 "condition": "> 5.0x",
117                 "spread_bps": 50
118             }
119         ],
120         "test_frequency": "quarterly"
121     }
122 ],
123 "default_pricing": {
124     "trigger": "event of default",
125     "rate_increase_bps": 200,
126     "application": "automatic"
127 }
128 },
129 "repayment": {
130     "final_maturity_date": "2005-11-17",
131     "scheduled_amortization": [
132         {
133             "date": "2000-09-30",
134             "amount": 3875000
135         },
136         {
137             "date": "2001-09-30",
138             "amount": 7750000
139         },
140         {
141             "date": "2002-09-30",
142             "amount": 11625000
143         },
144         {
145             "date": "2003-09-30",
146             "amount": 15500000
147         },
148         {
149             "date": "2004-09-30",
150             "amount": 15500000
151         }
152     ],
153     "mandatory_prepayments": [
154         {
155             "trigger": "cash proceeds from casualty exceeding $250,000 in a fiscal year",
156             "percentage": 1.0
157         },
158         {
159             "trigger": "cash proceeds from net disposition exceeding $250,000 in a fiscal year",
160             "percentage": 1.0
161         },
162         {
163             "trigger": "excess cash flow",

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164         "percentage": 0.5
165     }
166 ]
167 },
168 "conditions": {
169     "financial_covenants": [
170         {
171             "metric": "leverage ratio",
172             "threshold": 6.35,
173             "test_frequency": "quarterly"
174         },
175         {
176             "metric": "fixed charge coverage ratio",
177             "threshold": 1.05,
178             "test_frequency": "quarterly"
179         }
180     ],
181     "covenants": [
182         {
183             "type": "affirmative",
184             "description": "maintenance of existence, compliance with laws, environmental laws
185                             , insurance, books and records"
186         },
187         {
188             "type": "negative",
189             "description": "no incurrence of additional indebtedness, liens, investments,
190                             restricted payments, mergers, asset dispositions, or amendments that would
191                             adversely affect the lenders"
192         }
193     ],
194     "default_events": [
195         {
196             "event": "non-payment",
197             "details": "failure to pay principal or interest for more than 5 business days"
198         },
199         {
200             "event": "breach of warranty",
201             "details": "incorrectness or breach of representations or warranties"
202         },
203         {
204             "event": "default on other indebtedness",
205             "details": "default exceeding $5,000,000"
206         },
207         {
208             "event": "judgments",
209             "details": "judgments exceeding $5,000,000 not vacated or discharged within 30
210                             days"
211         },
212         {
213             "event": "bankruptcy or insolvency",
214             "details": "any insolvency, bankruptcy, or similar proceeding"
215         }
216     ]
217 },
218 "fees_and_costs": {
219     "commitment_fee": {
220         "rate": "0.5% per annum",
221         "basis": "unused commitment",
222         "payment_schedule": "quarterly in arrears"
223     },
224     "letter_of_credit_fee": {

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221     "rate": "applicable margin for LIBOR loans",
222     "payment_schedule": "quarterly in arrears and at issuance"
223 },
224     "administrative_fees": "as specified in fee letter"
225 },
226     "security_and_guarantees": {
227         "security": {
228             "secured": true,
229             "collateral": "all assets of the borrowers and subsidiaries",
230             "priority": "first priority"
231         },
232         "guaranty": {
233             "guarantor": "Holdings",
234             "type": "full and unconditional",
235             "obligations": "full and punctual payment of all obligations"
236         },
237         "mortgages": "on real property as specified",
238         "perfection_certificates": "delivered and filed as required"
239     },
240     "administrative": {
241         "governing_law": "New York",
242         "notices": "to be in writing, addressed as specified",
243         "amendments": "must be in writing and consented by required lenders",
244         "jurisdiction": "courts of New York",
245         "waiver_of_jury_trial": true
246     }
247 }
248 }

```

6 Conclusion

The extraction works. Same prompt handles everything from simple notes to complex syndicated deals. Output is consistent JSON that can go straight into a database.

Main advantage: no need to write different schemas for each document type. The natural language instructions adapt to whatever's in the document.