

MICHIGAN STATE

UNIVERSITY

Beta Presentation

Domain-Specific Language Tooling Ecosystem

The Capstone Experience

Team Delta Dental dSLATE

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*From Students...
...to Professionals*

Project Overview

- Difficult maintainability of excel spreadsheets
- Previously developed capstone projects addressed different parts of this issue
- Comprehensive tooling ecosystem to streamline rate calculation



Team Member's Technical Tasks

Technical Tasks Assigned

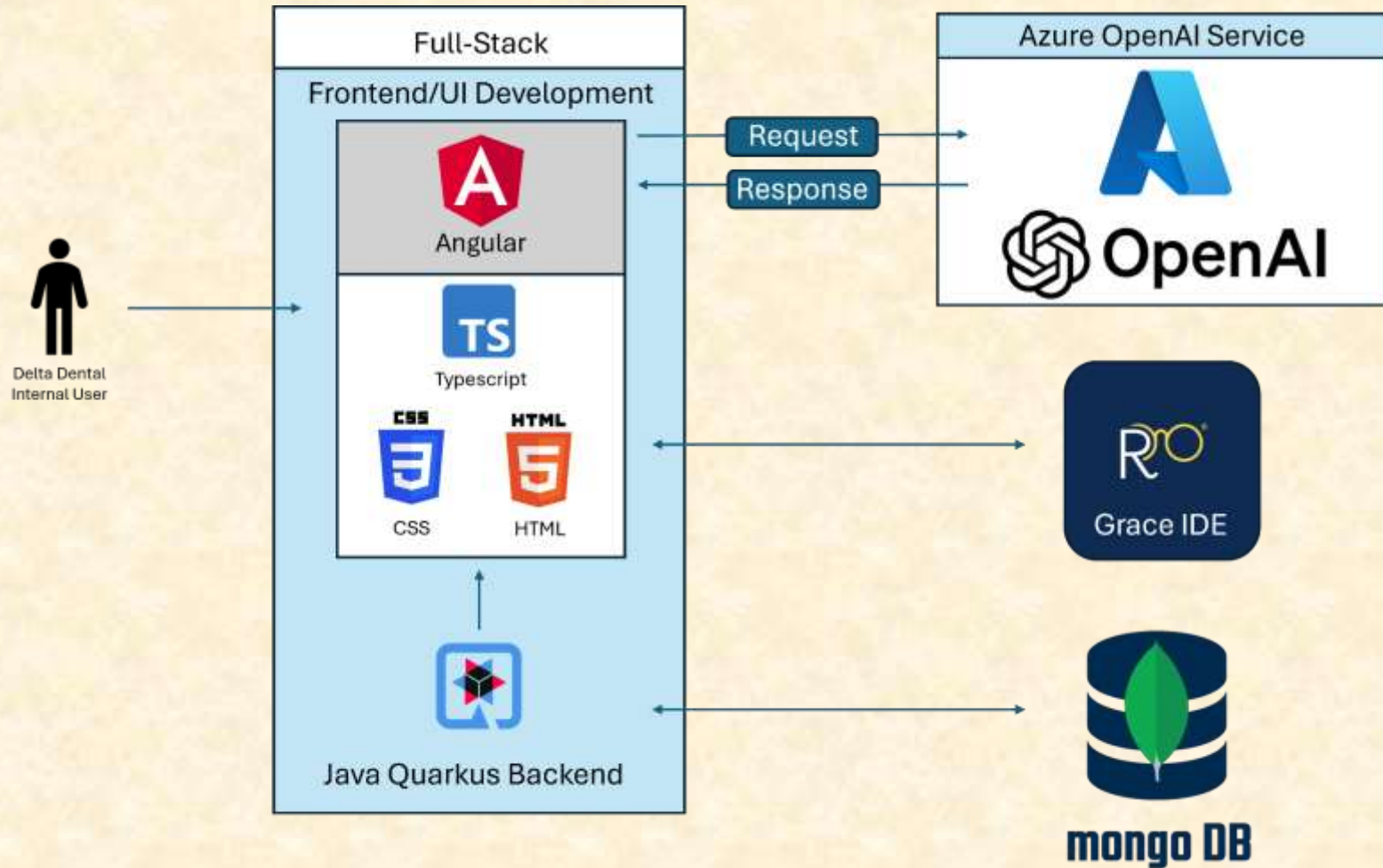
- Joseph Hughes
 - Factor Management(Dynamic Table)
 - Factor Management(Table UI features)
 - Factor Labels Structure
 - Formula Overview(General Functionality)
- Jude Hansen
 - Integration of GRACE IDE
 - Integration of Excel Data Extractor
 - Update project to current versions
 - Link IDE and Excel Data Extractor
- Henry Greer
 - Login page and authentication
 - Added creation and modification of formula versions
 - Added persistent storage for formulas and factors
- Antonio Capozzoli
 - Formula/Factor Search Page
 - Formula Overview (Associated Factors/Workbooks)
 - Dynamic Repository Querying
- David Wells
 - Integration of Data Modeler Service
 - Create database connections to each page besides log-in
 - Add load and save ability to dynamic page elements
- Mitchell Ballinger
 - GRACE Knowledge Assistant Backend API connection with Azure
 - GRACE Knowledge Assistant querying components
 - GRACE Copilot within IDE
 - Prompting of both models

Technical Tasks Completed

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 - Factor Management(Dynamic Table)
 - Factor Management(Table UI features)
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System Architecture



Formula Search

Name:	Description:	Effective Date:	
<input type="text"/>	<input type="text"/>	<input type="text" value="mm/dd/yyyy"/>	<input type="button" value="CLEAR"/>
<input type="button" value="SEARCH"/>			
Hermiston LLC	Formula for Hermiston LLC, updated for 2025 values	2024-04-24	
CFA Claim Frequency Adjustment	Penalizes frequent claims by adding a surcharge for excessive dental visits within a year.	2025-04-01	
BCF Basic Coverage Formula	Calculates premiums based on age, location, and a base rate for preventive care.	2024-12-23	
CRFM Comprehensive Risk Factor Model	Incorporates medical history, previous dental claims, and lifestyle factors to adjust premiums.	2024-09-13	
Utilization-Based Adjustment	Adjusts rates based on the insured's past dental service usage over the last 3 years.	2024-03-06	
Preventive Incentive PIM	Rewards policyholders with lower rates if they maintain regular cleanings and check-ups.	2024-05-17	
Cost-Sharing Optimization CSO	Determines the balance between deductible, copay, and coinsurance based on selected plan tier.	2024-07-24	
FPA Family Plan Aggregation	Applies discounts for multiple family members and determines premium scaling based on dependents.	2024-06-13	
Larkin Group	This formula calculates the insurance rate of Larkin Group LLC	2025-03-27	
Walsh-Beier	Walsh-Beier group, DISCOUNT version. Update to account for restructuring.	2025-03-26	
Miller and Sons	Premium rate for Miller and Sons based on number of employees and freelancers currently employed	2025-03-31	



Formula Overview

The screenshot displays the GRACE Ecosystem web application interface. The browser address bar shows the URL `deltadental.graceecosystem.com/overview`. The page header includes the Delta Dental logo, the text "GRACE Ecosystem", the user name "John Davis", and a "SIGN OUT" button. The main content area is titled "Formula Overview" and "Larkin Group". It features three primary panels: "Factors" on the left, "GRACE Knowledge Assistant" in the center, and "Version History" on the right. The "Factors" panel lists "BaseRate Number" and "Voluntary Number", each with a trash icon. The "GRACE Knowledge Assistant" panel contains a text input field with the placeholder "Ask a question...", a "Clear Conversation" button, and a "Send" button. The "Version History" panel shows two entries: "Version 2" edited by John Davis on 2024-12-23, and "Version 1" edited by Margaret Thompson on 2024-12-20. A fourth panel, "Associated Workbooks", is partially visible at the bottom right. A vertical sidebar on the left contains navigation icons for Search, Formula Overview, Factor Management, IDE, and Email Extractor.



Factor Management

The screenshot shows the 'Factor Management' interface for 'BaseRate'. The page includes a navigation sidebar, a search bar, and a list of labels. The main content area displays a table of rates for different risk levels and coverage types.

Factor Management: BaseRate

Description: The factor calculates the base rate of insurance for a new customer according to their number of employees, coverage type, and risk level.

Factor #8

Labels:

- NumberOfEmployees: <20, 20-150, 150-500, 500+
- NewHireEligibility: Start, 60 Days, 180 Days, 1 Year+
- CoverageType: Basic, Premium, Preventative
- RiskLevel: Low, Medium, High
- FreelanceEligibility: Yes, No

Table:

		Yes				Premium			
		<20	20-150	150-500	500+	<20	20-150	150-500	500+
Low	Start	4.61	2.86	2.78	4.03	9.83	5.88	9.12	4.74
	60 Days	1.06	5.51	0.56	3.35	1.60	6.29	5.09	0.76
	180 Days	1.44	1.43	1.57	3.92	1.84	2.27	5.16	0.23
	1 Year+	9.10	4.22	5.76	6.70	2.04	4.68	3.16	9.75
Medium	Start	0.70	6.98	9.49	5.36	4.28	3.80	4.14	3.84
	60 Days	0.48	0.39	9.02	4.50	7.69	4.97	4.34	1.79
	180 Days	3.07	5.52	7.68	2.87	1.52	3.02	1.85	9.94

DSL IDE

The screenshot displays the DSL IDE interface within a browser window titled "GRACE Ecosystem". The browser address bar shows "deltadental.graceecosystem.com/grace-ide". The interface includes a top navigation bar with the Delta Dental logo and "GRACE Ecosystem" text, a user profile for "John Davis" with a "SIGN OUT" button, and a "Copilot" button. A menu bar contains "File", "Edit", "Selection", "View", and "Help". On the left, a vertical sidebar contains icons for "Search", "Formula Overview", "Factor Manipulation", "IDE", and "Facet Extractor". The main workspace is divided into three sections: a "File Explorer" on the left showing a file named "Bookrates-TN-2024-1-1-v0.grace"; a central code editor displaying a DSL script for "tn.smallgroupratingmodel"; and a "GRACE Navigator" at the bottom showing a table of labels and their values. On the right, a "Program received!" chat window contains a message from the user asking for factors used in rate calculations, a response from the IDE listing "BaseRateFactor" and "VoluntaryFactor", and a follow-up user message asking to generate code.

```
1 program tn.smallgroupratingmodel:
2
3 // TODO need to update all factors for 2024
4 // 2024 DDTN factors, split off 2023 version on 2023-10-20
5 // constructed from "DOTN Small Group Rating Model" excel spreadsheet
6
7 ----- Labels -----
8 $ProductType : {
9   "Premier Plan 1",
10  "Premier Plan 2",
11  "Dual Network Plan 1",
12  "Dual Network Plan 3",
13  "Dual Network Plan 4",
14  "Preventive Advantage Plan",
15  "PPO Plan 1",
16  "PPO Plan 2",
17  "PPO Plan 3"
18 };
19
20 $Tiers : {
21   "2-party",
22   "3-party",

```

GRACE Navigator	Labels	Measurements	Functions
Name	Size	Values	
\$BenefitImprovement	2	Yes, No	
\$Copy	5	None, \$10 - Applies to All Services, \$20 - Applies to All Services, \$10 - Applies to D&P Services, \$20 - Applies to D&P Services	
\$DPMaxAdvantage	2	Yes, No	
\$Deductible	2	\$25 or \$75, \$50 or \$150	

Program received!

Can you tell me what factors are used in the current program

In the provided GRACE program, the following factors are used in the rate calculations:

1. **"BaseRateFactor"**: A multi-dimensional factor that varies by rate type, small group category, and product type.
2. **"VoluntaryFactor"**: A factor that varies based on the small group category and whether the coverage

Tell me to generate some code...

Clear Conversation Send



Excel Extractor

The screenshot shows the GRACE Ecosystem web interface. The browser address bar displays the URL: `deltadental.graceecosystem.com/workbooks/67edb52f44ef3609fafa70d`. The user is logged in as John Davis, with a **SIGN OUT** button. The interface features a green sidebar with navigation icons for Search, Formula Overview, Factor Management, IDE, and Excel Extractor. The main content area is divided into three tabs: **Settings**, **Open Data Modeler**, and **View Labels and Measurements**. The **Settings** tab is active, displaying a table of data for Buckridge-Jacobs.

	A	B	C	D	E	F	G
1	Buckridge-Jacobs						
2	Company Size:	14					
3	Copayment:	20					
4	Plan:	Basic					
5	Member Type:	Spouse					
6	Procedure Category:	Root Canals					
7	Necessary Only?	Yes					
8	Priority Wait?	Yes					
9	Formula						
10	Base Rates	Necessary	Copayment	Priority Wait	Member Type	Procedure Category	Final Rates
11	18.84	0.60	0.90	1.10	0.90	0.72	10
12	34.52	0.60	0.90	1.10	0.90	0.72	20.90
13	56.20	0.60	0.90	1.10	0.90	0.72	33.38
14	77.69	0.60	0.90	1.10	0.90	0.72	46.15

At the bottom of the interface, there are tabs for **Main** and **Factors**, and an **OPTIONS** button.



What's left to do?

- Features
- Stretch Goals
- Other Tasks
 - Continue Prompt Engineering
 - Clean up UI
 - Bug fixes and optimizations



Questions?

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