

**MICHIGAN STATE**  

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**UNIVERSITY**

# Project Plan Presentation

## Domain-Specific Language Tooling Ecosystem

### The Capstone Experience

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

# Project Sponsor Overview

- Delta Dental of Michigan is subsidiary of nation's leading provider of dental insurance
- Part of Delta Dental Plans Association
  - Nationwide system of independently operated dental health service plans
  - Offers coverage to 83 million Americans
- Subsidiary of Delta Dental of Michigan will distribute software to other Delta Dentals



# Project Functional Specifications

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- Improve accessibility and scalability of Domain Specific Language
- By building a centralized tooling ecosystem
- That streamlines rate calculation schemas
- Through simplifying user interactions



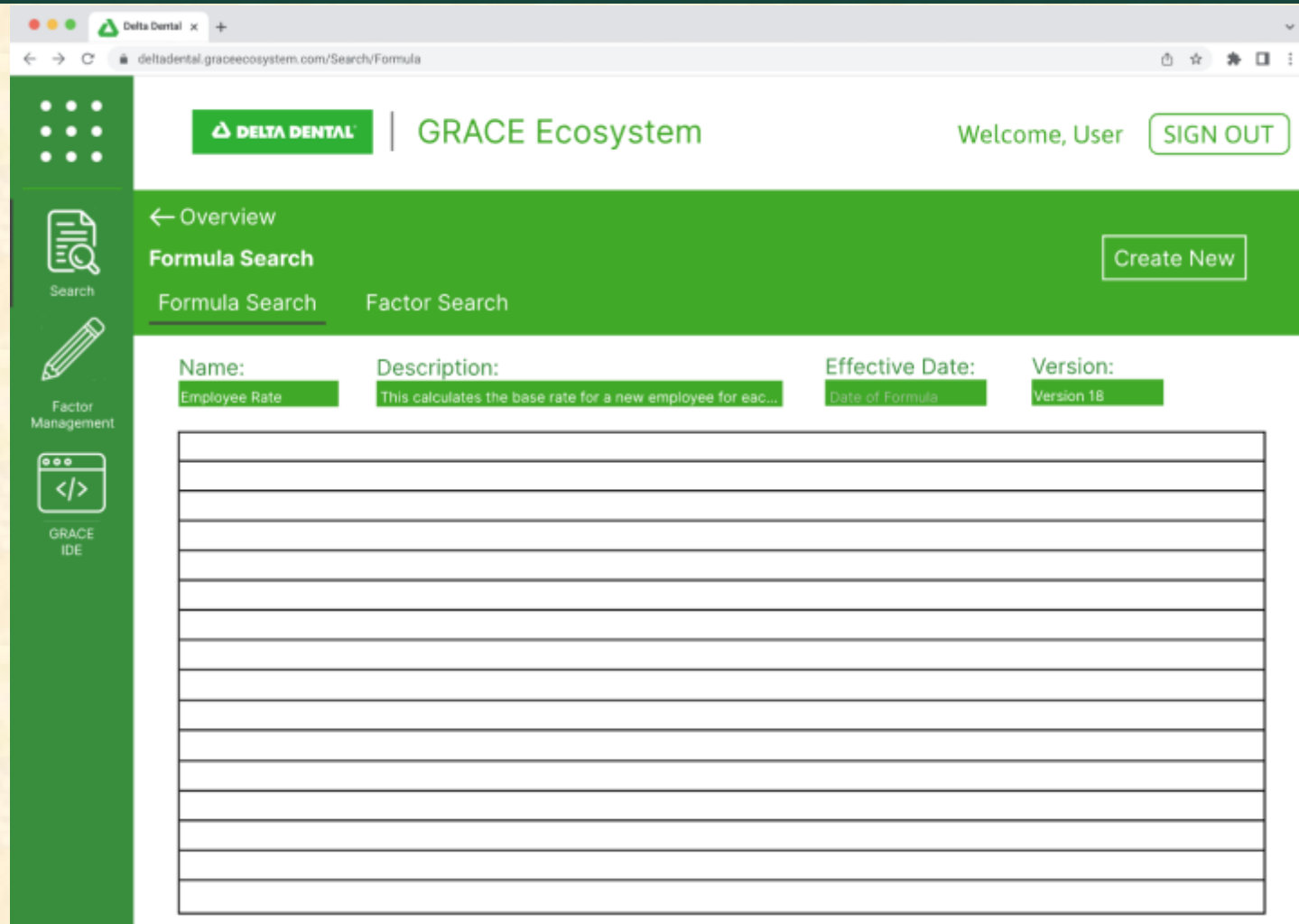
# Project Design Specifications

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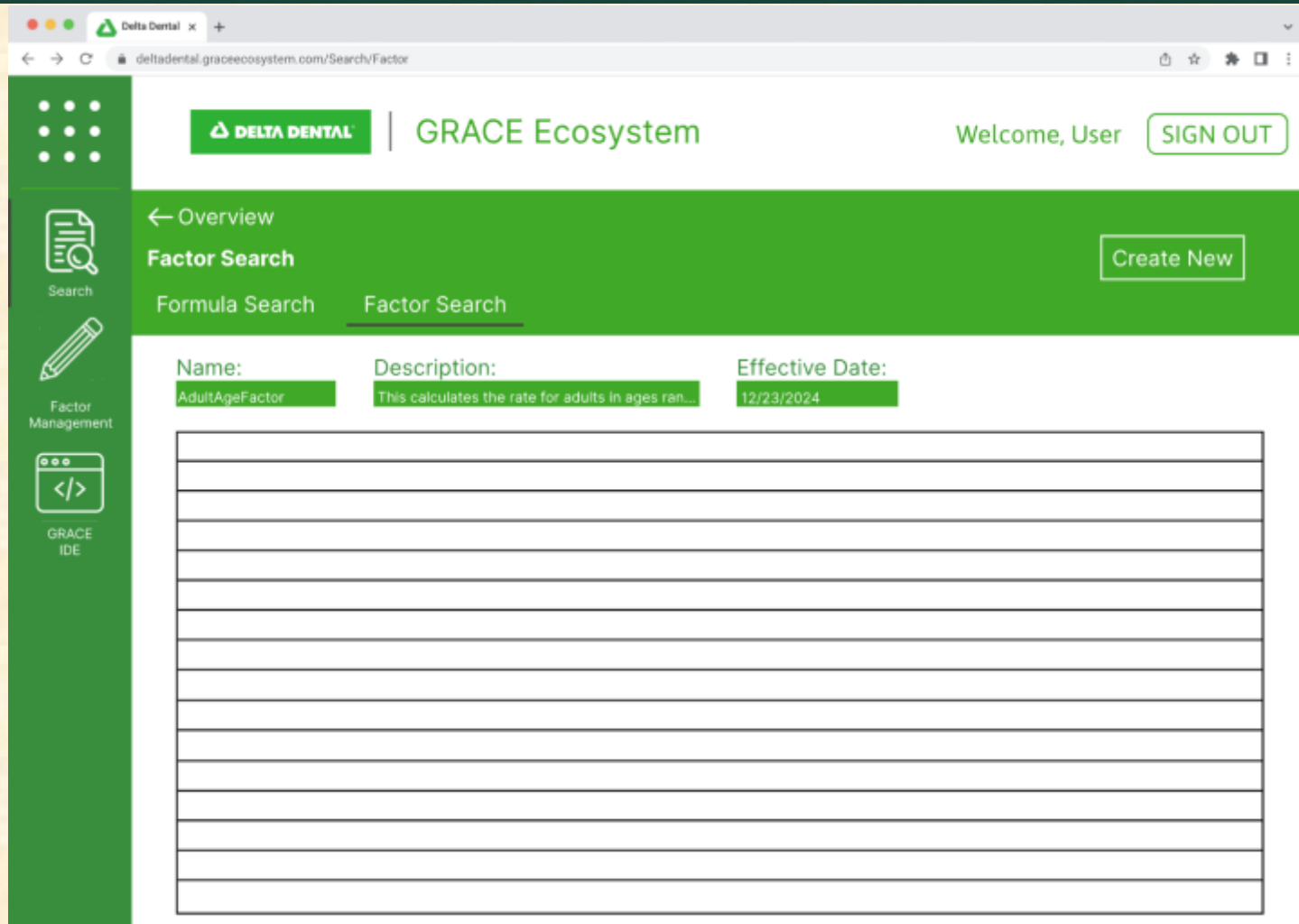
- Web application
- Follows Delta Dental branding standards
- Sidebar navigation
- Rate calculation formula overview
- Factor management
- N-Dimensional table
- Factor and Formula search
- GRACE IDE



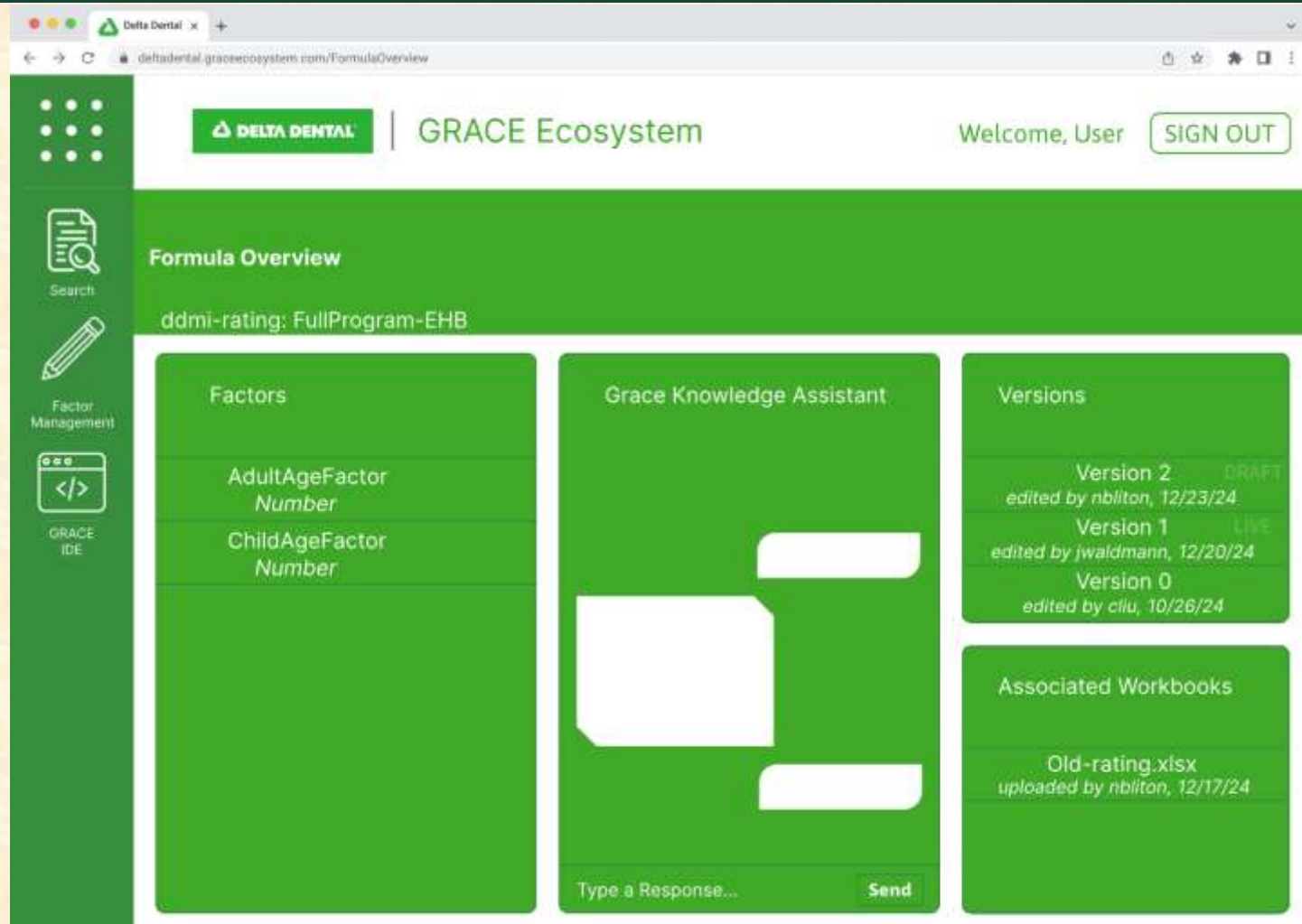
# Screen Mockup: Formula Search Page



# Screen Mockup: Factor Search Page



# Screen Mockup: Formula Overview



# Screen Mockup: Factor Management

The screenshot displays a web application interface for Factor Management. The header includes the Delta Dental logo and 'GRACE Ecosystem', along with a user greeting 'Welcome, User' and a 'SIGN OUT' button. The main content area is titled 'Factor Management BaseRate' and includes a description: 'This calculates the base rate for a new customer for each state according...'. Below the description, there is a 'Labels' section with a list of labels: 'State', 'Subscriber', and 'Network', each with an edit icon. To the right of the labels is a table with columns for 'MI', 'IN', and 'OH', and rows for 'Subscriber', 'Spouse', and 'Dependent' with their respective values.

		MI	IN	OH	
Subscriber	PPE	7.8	7.2		
	Premier	2.1	2.3		
	EPO	3.7	3.5		
Spouse	PPE	6.0			
	Premier	1.1			
	EPO	7.3			
Dependent	PPE	N/A	N/A	N/A	
	Premier	N/A	N/A	N/A	





# Screen Mockup: DSL IDE

The screenshot displays the Delta Dental DSL IDE interface. The browser address bar shows `delatadental.graceecosystem.com/Editor`. The header includes the Delta Dental logo, the text "GRACE Ecosystem", a user greeting "Welcome, User", and a "SIGN OUT" button. A menu bar contains "File", "Edit", "Selection", "View", and "Help".

The main workspace is divided into three sections:

- File Explorer:** Shows a file named `grace-sample.grace`.
- Code Editor:** Contains the following DSL code:

```
1 @engraver com.sample.rate;
2 @Network : { "P00", "P000" };
3 @DentalProcedure : { "Cleaning", "X-ray", "Tooth Extraction", "Crown" };
4
5 BaseSeverity : number[@Network, @DentalProcedure];
6 Utilization : number[@DentalProcedure];
7 BaseSeverity["%", "0"] = {
8   50.0, 55.0, 120.0, 1000.0,
9   60.0, 65.0, 140.0, 1200.0
10 };
11
12 Utilization["0"] = { 1.00, 0.75, 0.11, 0.01 };
13 BaseSeverity["%", "0"] = BaseSeverity["%", "0"] * Utilization["0"];
14
15 @Homework : { "H01", "H02", "H03", "H04" };
16 @Student : { "John", "Bob", "Alice" };
17
18 sum : (#n1:Integer, #n2:Integer) -> Integer
19 {
20   #n1 + #n2
21 };
22
23 HW_score : Integer[@Student, @Homework];
24 Final_score_student : Integer[@Student];
25 HW_score["student", "hw"] = {
26   23, 10, 22, 24,
27   15, 25, 10, 10
28 };
```
- GRACE Navigator:** A table with tabs for "Labels", "Measurement", and "Functions". The "Measurement" tab is active, showing the following data:

Name	Type	Size	findings
BaseSeverity	Number	2	@Network, @DentalProcedure
Utilization	Number	1	@DentalProcedure

At the bottom right, there is a "Type a Response..." input field and a "Send" button.



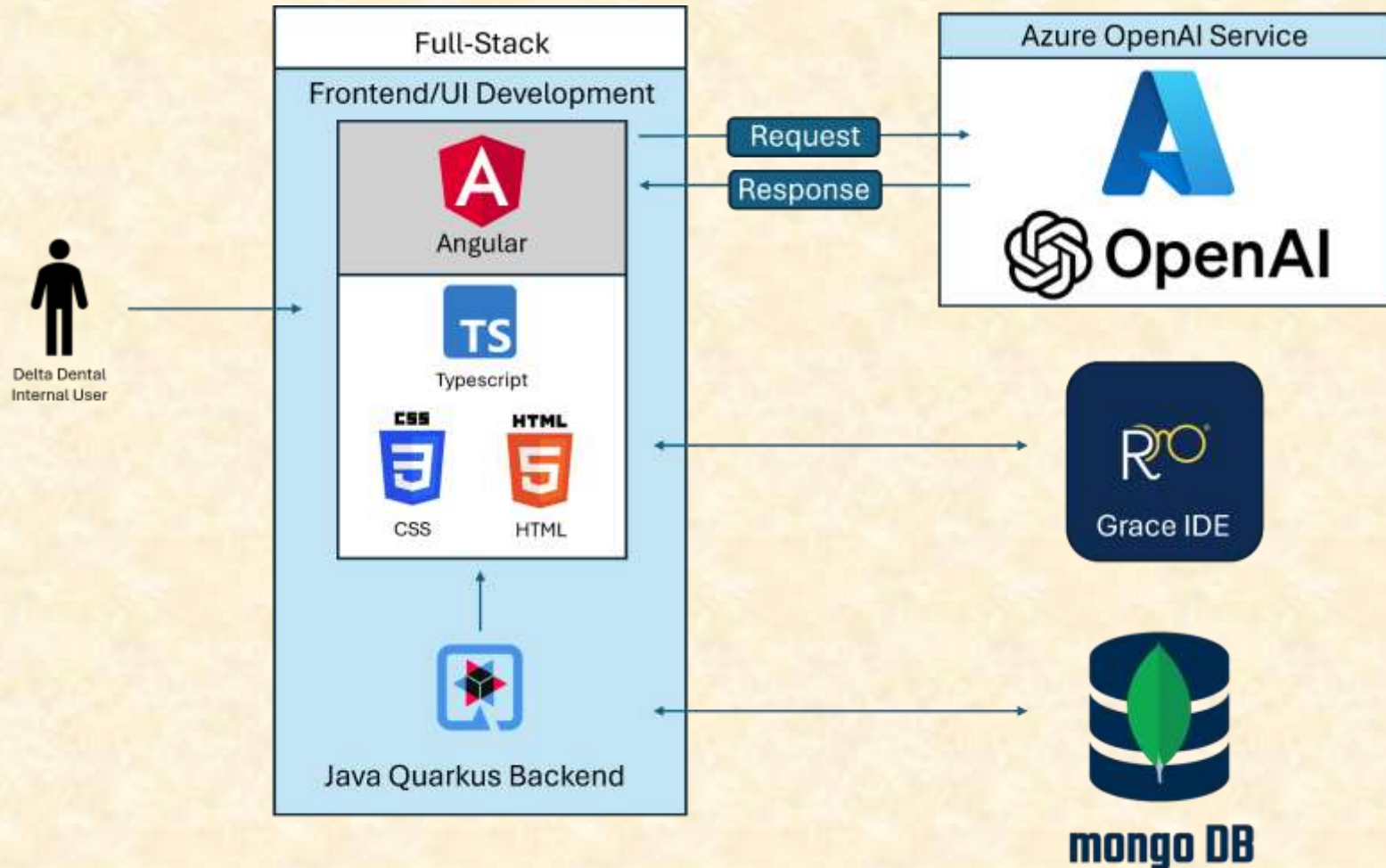
# Project Technical Specifications

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- Locally hosted web application
- Integrated AI assistant trained through prompt engineering
- Built-in IDE for editing DSL in real-time
- User-entered data stored in remote database



# Project System Architecture



# Project System Components

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- Software Platforms / Technologies
  - Azure OpenAI Service
  - MongoDB
  - Angular Framework
  - Java Quarkus
  - Delta Dental GRACE IDE



# Project Risks

- AI Knowledge Assistant
  - Training an AI assistant with limited data on DSL
  - Using prompt engineering techniques
- N-Dimensional Data Table
  - Representation of N-dimensional data tables where n is the number of labels that calculate a factor
  - Speaking with non-technical users and clear UI choices
- Integration of previous Capstone projects
  - Previous projects are written in different versions of languages and are deployed in multiple ways
  - Testing projects extensively in their own environment and integrated environment



# Questions?

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