### 5.3 Explore Feature

**Feature Goal**: Provide an interactive visualization of philosophical concepts, allowing users to discover connections and deepen their understanding of philosophical ideas.

#### System Architecture

**Frontend Components**:

* ExploreScreen.tsx: Main concepts visualization
* ConceptDetail.tsx: Detailed view of a concept
* ConceptMap.tsx: D3.js visualization component
* ConceptSearch.tsx: Search functionality

**Backend Components**:

* concept\_service.py: Concept management and relationships
* user\_concept\_service.py: User progress tracking

**Database Models**:

* concepts: Core concept definitions

CREATE TABLE concepts (

id UUID PRIMARY KEY DEFAULT uuid\_generate\_v4(),

name VARCHAR(100) NOT NULL UNIQUE,

description TEXT NOT NULL,

short\_description VARCHAR(255) NOT NULL,

school\_id UUID REFERENCES concept\_schools(id),

level INTEGER NOT NULL,

parent\_id UUID REFERENCES concepts(id),

created\_at TIMESTAMP WITH TIME ZONE DEFAULT NOW(),

updated\_at TIMESTAMP WITH TIME ZONE DEFAULT NOW()

);

* concept\_relationships: Connections between concepts

CREATE TABLE concept\_relationships (

id UUID PRIMARY KEY DEFAULT uuid\_generate\_v4(),

source\_id UUID NOT NULL REFERENCES concepts(id),

target\_id UUID NOT NULL REFERENCES concepts(id),

relationship\_type VARCHAR(50) NOT NULL,

strength FLOAT NOT NULL,

description TEXT,

created\_at TIMESTAMP WITH TIME ZONE DEFAULT NOW(),

UNIQUE(source\_id, target\_id)

);

* concept\_schools: Philosophical schools/categories

CREATE TABLE concept\_schools (

id UUID PRIMARY KEY DEFAULT uuid\_generate\_v4(),

name VARCHAR(100) NOT NULL UNIQUE,

description TEXT NOT NULL,

color VARCHAR(7) NOT NULL,

created\_at TIMESTAMP WITH TIME ZONE DEFAULT NOW()

);

* user\_concept\_progress: User's mastery of concepts

CREATE TABLE user\_concept\_progress (

id UUID PRIMARY KEY DEFAULT uuid\_generate\_v4(),

user\_id UUID NOT NULL REFERENCES users(id),

concept\_id UUID NOT NULL REFERENCES concepts(id),

mastery\_level INTEGER NOT NULL DEFAULT 0,

interaction\_count INTEGER NOT NULL DEFAULT 0,

last\_interaction TIMESTAMP WITH TIME ZONE,

created\_at TIMESTAMP WITH TIME ZONE DEFAULT NOW(),

updated\_at TIMESTAMP WITH TIME ZONE DEFAULT NOW(),

UNIQUE(user\_id, concept\_id)

);

#### API Endpoints

* GET /api/v1/concepts: Get all concepts
  + Query Parameters:
    - school\_id: Filter by philosophical school
    - level: Filter by concept level
    - search: Search by name or description
  + Response:

{

"concepts": [

{

"id": "550e8400-e29b-41d4-a716-446655440000",

"name": "Virtue Ethics",

"short\_description": "An approach focusing on character and virtue rather than duty or consequences",

"school": {

"id": "450e8400-e29b-41d4-a716-446655440000",

"name": "Ethics",

"color": "#4CAF50"

},

"level": 2,

"user\_mastery": 1

},

...

],

"total": 120

}

* GET /api/v1/concepts/{id}: Get concept details
  + Response:

{

"id": "550e8400-e29b-41d4-a716-446655440000",

"name": "Virtue Ethics",

"description": "...",

"short\_description": "...",

"school": {

"id": "450e8400-e29b-41d4-a716-446655440000",

"name": "Ethics",

"color": "#4CAF50"

},

"level": 2,

"parent": {

"id": "550e8400-e29b-41d4-a716-446655440001",

"name": "Ethics",

"short\_description": "..."

},

"user\_progress": {

"mastery\_level": 1,

"interaction\_count": 5,

"last\_interaction": "2025-05-20T10:30:00Z"

},

"related\_quests": [

{

"id": "650e8400-e29b-41d4-a716-446655440000",

"title": "Aristotle's Virtue Ethics",

"difficulty": "medium"

},

...

],

"related\_concepts": [

{

"id": "550e8400-e29b-41d4-a716-446655440002",

"name": "Eudaimonia",

"relationship\_type": "component",

"strength": 0.9

},

...

]

}

* GET /api/v1/concepts/{id}/related: Get related concepts
  + Response:

{

"concept\_id": "550e8400-e29b-41d4-a716-446655440000",

"related\_concepts": [

{

"id": "550e8400-e29b-41d4-a716-446655440002",

"name": "Eudaimonia",

"short\_description": "...",

"relationship\_type": "component",

"strength": 0.9,

"school": {

"id": "450e8400-e29b-41d4-a716-446655440000",

"name": "Ethics",

"color": "#4CAF50"

}

},

...

]

}

* POST /api/v1/concepts/{id}/view: Record concept view
  + Response:

{

"success": true,

"concept\_id": "550e8400-e29b-41d4-a716-446655440000",

"user\_progress": {

"mastery\_level": 1,

"interaction\_count": 6,

"xp\_earned": 3

}

}

#### User Experience Flow

1. User enters the Explore screen with the concept visualization (sun/planets/satellites metaphor)
2. User navigates the concept map using the ConceptMap component
   * Core philosophical domains (Ethics, Metaphysics, Epistemology, etc.) as "suns"
   * Major concepts within each domain as "planets"
   * Related concepts as "satellites"
3. User selects concepts to view details in the ConceptDetail component
4. System shows concept definition, related concepts, and mastery level
5. User can navigate to related concepts or search for specific ones using the ConceptSearch component
6. System tracks concept views and awards XP

#### XP Integration

* XP awarded for exploring new concepts (+3 XP per concept)
* XP awarded for reaching concept mastery levels:
  + Level 1 (Familiar): +10 XP
  + Level 2 (Knowledgeable): +25 XP
  + Level 3 (Mastery): +50 XP
* Badges for exploration breadth (number of concepts viewed) and depth (mastery levels achieved)

#### Implementation Considerations

* **Visualization Technology**: D3.js for the interactive concept map in Phase 1, with potential upgrade to Three.js for 3D visualization in Phase 2 (see Section 5.3.1)
* **Performance Optimization**: Lazy loading of concept data, pagination of related concepts
* **Offline Support**: Core concept definitions available offline after initial download
* **Concept Relationships**: Multiple relationship types (prerequisite, similar, opposite, component, etc.)
* **Progressive Disclosure**: Higher-level concepts unlocked as user progresses

#### 5.3.1 Visualization Implementation (Phased Approach)

**Phase 1: D3.js Implementation**

* 2D force-directed graph visualization
* Interactive nodes and connections
* Zoom and pan capabilities
* Filtering by domain/school
* Performance optimized for mobile devices

**Phase 2: Three.js Enhancement (Future)**

* 3D solar system metaphor
* Orbital mechanics for concept relationships
* Immersive exploration experience
* Enhanced visual effects
* AR capabilities (optional)