Initial Plan: Interactive Knowledge Mapping Platform

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Project Description

In today's digital age, learning new topics can be challenging because educational content is often presented in a straight-line format, like chapters in a textbook. However, real learning isn't always this straightforward - topics connect to each other in various ways, and different people may need different paths to understand a subject. This project aims to solve this problem by creating a web application where users can build and share visual maps of knowledge.

Think of these knowledge maps like a network where each point (node) represents a concept or topic, and lines (edges) between them show how they're related. For example, in a programming knowledge map, a "Variables" node might connect to both "Data Types" and "Memory Management," showing learners multiple paths they can explore. Users can add descriptions, links, and resources to each node, making it a rich learning resource.

What makes this project unique is its collaborative aspect. Users can choose to keep their maps private or share them with others using special access codes. The system will include a user rating feature (1-5 stars) to show expertise levels, helping others trust and value contributions. Users can work together to build comprehensive maps, suggest changes, and improve the overall learning experience.

The platform will be built using familiar and reliable web technologies: Flask for the backend, MySQL for the database, and JavaScript for making the interface interactive. While I will start with IoT (Internet of Things) topics as an example, the system will be designed to work with any subject area, from programming to history or science.

This project is challenging because it involves:

1. Creating an easy-to-use interface for building complex knowledge maps
2. Managing multiple users working on the same map at once
3. Building a fair system for rating user expertise
4. Making sure the platform can handle many users and different types of content

The goal is to create a tool that makes learning more intuitive and connected, allowing people to understand not just individual topics, but how different pieces of knowledge fit together.

Aims and Objectives

Overall Aim:

To develop an interactive web-based platform that enables users to create, visualise, and collaboratively edit knowledge maps, making learning paths clearer and more accessible.

Specific Objectives:

1. Design and implement an interactive knowledge map editor where users can:
    - Create, edit, and delete nodes and connections
    - Add metadata (descriptions, links, resources) to nodes
    - Visualise the relationships between different concepts

      Risk: The map visualisation might become cluttered and difficult to navigate with many nodes

      Mitigation: Implement zoom functionality and node clustering for large maps, with the option to filter and search specific nodes
2. Develop a collaborative system that allows:
    - Sharing maps through unique access codes
    - Multiple users to edit the same map simultaneously
    - Track and display user contributions
3. Create a user expertise system featuring:
    - 1-5 star rating mechanism for user expertise
    - Profile pages showing user contributions and expertise level
    - Verification process for expertise claims

      Risk: Users might attempt to manipulate the rating system

Mitigation: Implement administrator oversight and require evidence/peer validation for higher expertise levels

These objectives are realistic within the project timeframe while remaining ambitious enough to demonstrate technical capability. The focus is on creating a functional system that can be extended with additional features if time permits. Each objective builds upon the previous one, allowing for incremental development and testing.

Feasibility

The key considerations are as follows:
Ethical Approval:
Basic user authentication features (username/password) do not require ethical approval. However, if user testing is conducted for evaluation purposes, supervisor approval will be needed through the school's streamlined process. The project will primarily focus on technical implementation, with limited user testing for feedback. If user evaluation will be necessary, appropriate ethics approval forms will be obtained.
Resource Requirements:
The project requires a virtual machine for hosting the web application, which will be requested through university IT support. The application's requirements are modest:

- Standard web server capabilities for Flask
- MySQL database with basic storage needs
- Regular development tools (all freely available)

No specialised hardware or software licenses are required beyond these standard resources, making the technical implementation feasible within the university's infrastructure.
Legal Considerations:
The project will use only open-source technologies and frameworks, avoiding any licensing issues. All code developed will be original work, with proper attribution for any used libraries or resources.
These considerations have been factored into the work plan, with time allocated for setting up the development environment and obtaining necessary approvals if user testing is pursued.

Work Plan

Week 1-2: Foundation and Research
Tasks:

- Research existing knowledge mapping platforms and visualisation techniques
- Study Flask-MySQL integration methods
- Design initial database schema for users, maps, nodes, and edges
  Milestone: Complete system architecture document
  Deliverable: Database schema design document

Week 3-4: Basic System Setup
Tasks:

- Set up Flask development environment
- Implement basic database operations
- Create user authentication system (login/register)
- Develop basic HTML/CSS templates
  Milestone: Working login system with database connectivity
  Deliverable: Basic working web application

Week 5-6: Core Map Functionality
Tasks:

- Implement node creation and editing interface
- Develop edge connection functionality
- Create basic map visualisation using JavaScript

- Add save/load map features
  Milestone: Functional knowledge map creation system
  Deliverable: Working map editor prototype

Week 7: Spring Break - Advanced Features
Tasks:
- Implement map sharing functionality
- Add unique access code generation
- Develop user profile pages
  Milestone: Working collaboration features
  Deliverable: Collaborative editing capability

Week 8-9: User Interface Enhancement and Extra Features
Tasks:
- Add map customisation options (colours, shapes)
- Implement search functionality
- Create user expertise rating system
- Conduct user testing
- Implement any additional features (map history, advanced filtering, etc.)
- Add any extra functionality based on user feedback
  Milestone: Complete user interface with testing feedback and extra features
  Deliverable: Enhanced working prototype with additional features

Week 10: Report Writing - First Draft
Tasks:
- Write introduction and background
- Document system architecture
- Begin methodology section
  Milestone: Completed first draft of report sections
  Deliverable: Initial report draft

Week 11: Report Writing - Content Completion
Tasks:
- Complete implementation details
- Write evaluation section
- Document testing results
- Add figures and diagrams
  Milestone: Completed main report content
  Deliverable: Full report draft

Week 12: Report Finalisation
Tasks:
- Final proofreading and editing
- Format references and appendices
- Review and refine all sections
  Milestone: Completed final report
  Deliverable: Final project report