# COT6930 – GenAI in Software Development Lifecycles

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# Assignment 1 – Use Case Design and First Mockup

# Solution Overview

Group: Huang’s Hype Factory

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Discord Bot: Huang’s Hype Factory

# Scope

A diagram of a workflow

Description automatically generated

Solution Ideation

We seek to develop a solution Huang’s Hype Factory, aligned with the Use Case “Ask Document” for Enhancing Basecamp with AI-Powered Knowledge Assistance (a bot) at Digital Resource (DR).

Digital Resource offers professional search engine optimization, digital advertising, and social media marketing services that secure competitive search engine rankings, increase brand awareness, and convert leads into real revenue. DR utilizes Basecamp as its central hub for project management and collaboration. While Basecamp effectively facilitates task management and communication, it presents challenges in efficiently accessing and utilizing the wealth of information generated within each project. This information overload, coupled with inherent limitations in Basecamp's search functionality, impacts efficiency and presents obstacles in onboarding new team members. Our solution aims at enhancing Basecamp to navigate through a diverse range of data (such as to-dos, discussions, documents), handle complex/nuanced queries and provide related information effectively as projects progress and data volume grows. This will directly impact on efficiency by reducing the amount of time spent on searching, minimizing duplicated efforts among the team and accelerating decision making process. In addition to this, it helps with onboarding new team members in getting up to speed on existing projects as well as expanding the knowledge access within DR leading to a more productive and informed workplace.

The solution will work as follows:

1. **Smart Data Extraction** – Automatically extract relevant information from Basecamp messages, documents, and to-dos using NLP techniques.
2. **Context-Aware Search** – Enable users to retrieve project details, discussions, and files through intelligent search with keyword relevance and semantic understanding.
3. **Automated Summarization** – Generate concise summaries of project updates, discussions, and documents for quick comprehension.
4. **Task and Deadline Tracking** – Organize and retrieve task lists, due dates, and milestones to keep users informed about project timelines.
5. **Proactive Notifications & Insights** – Provide personalized notifications and insights based on project activity, deadlines, and discussion trends

## Requirement Analysis

Huang’s Hype Factory should be able to support the following **interactions**:

### 1️ ****Extracting Information****

**Q:** What were the key decisions made in last week's project discussion?  
**A:** Here’s a summary of key decisions from last week’s discussion in the “Marketing Strategy” project:

* ✅ Approved budget increase for ad campaigns
* ✅ Finalized social media posting schedule
* ✅ Assigned content creation to Alex & Jordan

### 2️ ****Retrieving Documents****

**Q:** Can you find the latest version of the project proposal document?  
**A:** Sure! The latest project proposal, "Project\_Proposal\_v3.pdf," was uploaded by Sarah on Jan 28, 2025. Here’s the link to access it: [Basecamp Link]

### 3️ ****Tracking Deadlines****

**Q:** What deadlines are coming up next week for my team?  
**A:** Here are your team’s upcoming deadlines:

* 📅 **Feb 5:** Submit client presentation draft (Assigned to Lisa)
* 📅 **Feb 7:** Final review meeting for product launch (Team-wide)

### 4️ ****Context-Aware Search****

**Q:** What has been discussed about the "customer feedback" in our project?  
**A:** I found multiple discussions mentioning "customer feedback." The most relevant one is from Jan 25, where Alex suggested improving response times based on survey results. Would you like a summary or full details?

### 5️ ****Proactive Insights****

**Q:** Any important project updates I missed while I was away?  
**A:** You missed 12 messages and 3 task updates in the "Product Development" project. Key highlights:

* 🔹 New sprint plan finalized
* 🔹 Bug fixes scheduled for next release
* 🔹 Budget review scheduled for Feb 10

To support these interactions, Huang’s Hype Factory must implement the following functionality:

1. **It must support Natural Language Processing (NLP)** to enable users to query project data conversationally and retrieve relevant information intelligently (immediate).
2. **It requires a structured database or indexing system** to store, organize, and quickly retrieve extracted information from Basecamp projects (short-term).
3. **It should generate visual representations, such as graphs or charts**, to help users analyze project timelines, task progress, or discussion trends (long-term).
4. **It must integrate with Basecamp’s API** to continuously extract, update, and synchronize data from projects, messages, tasks, and files (long-term)..
5. **It should provide proactive notifications and insights** based on project activities, upcoming deadlines, and important discussions to keep users informed (long-term).

## Platform Requirements

The Development Platform must provide the following functionality in order to support the implementation of this solution:

1. **It must incorporate Retrieval-Augmented Generation (RAG)** to fetch relevant project data from Basecamp and generate contextual responses dynamically.
2. **It requires a knowledge graph** to map relationships between project discussions, tasks, documents, and team members for intelligent data retrieval.
3. **It should leverage advanced prompt engineering** to structure user queries efficiently and optimize responses based on context and intent.
4. **It must integrate a vector database** to store and retrieve semantically relevant project information for accurate and fast search capabilities.
5. **It should support multi-step reasoning pipelines** to break down complex queries, analyze project data hierarchically, and provide insightful responses.

## Solution Roadmap

NOTE: this is the ‘Requirement Prioritization’

We will implement our ‘Study Companion’ Discord Bot’ following this roadmap.

v0.1 Mockup

* Basic Interactions
* Demonstrate the Question-Answer that we aim to support
* Configure the Rules of your Discord Bot Runner to support the demonstration Questions-Answers; follow the instructions inline
* (any other element of the requirements to support here? Unlikely, but list if you have anything)

V0.2 Second Release

**Basic NLP-Based Query Handling**

* Users can ask questions in natural language, and the bot will return relevant Basecamp data.
* Simple keyword-based and intent-based retrieval (no deep semantic search yet).

**Basecamp API Integration (Read-Only Mode)**

* Extract and fetch project data, such as messages, to-dos, documents, and discussions.
* No complex indexing, just basic structured retrieval.

**RAG Lite (Simple Document Retrieval + Response Generation)**

* Implement a basic **Retrieval-Augmented Generation (RAG)** pipeline:
  + Retrieve Basecamp project data (text-based only).
  + Generate responses using a lightweight LLM model (e.g., GPT-3.5 or LLaMA).

**Basic Prompt Engineering for Contextual Responses**

* Craft structured prompts to improve response accuracy.
* Use templates to summarize discussions, list deadlines, or highlight key decisions.

**Simple Database for Caching & Quick Lookups**

* Store frequently accessed project details in a lightweight database (SQLite/PostgreSQL).
* Reduce API calls by caching recently retrieved data.

V0.3 Third Release

**Improved NLP with Contextual Understanding**

* Enhance natural language understanding (NLU) to process more complex queries.
* Implement named entity recognition (NER) to identify projects, deadlines, and users.

**Advanced Retrieval-Augmented Generation (RAG)**

* Implement **semantic search** with a **vector database (e.g., FAISS, Pinecone)** for more accurate retrieval.
* Combine structured and unstructured data retrieval to improve response relevance.

**Knowledge Graph for Relationship Mapping**

* Develop a basic **knowledge graph** to map relationships between projects, tasks, discussions, and users.
* Improve data linking for more intuitive knowledge retrieval.

**Enhanced Prompt Engineering with Adaptive Responses**

* Use **dynamic prompt templates** based on query intent (e.g., summaries, Q&A, insights).
* Optimize responses with **multi-step reasoning** for complex queries.

**Proactive Notifications & Smart Alerts**

* Introduce **automated alerts** for upcoming deadlines, unread discussions, and important project changes.
* Allow users to set up **custom notifications** based on activity triggers.

**Basic Visual Representations (Graphs & Summaries)**

* Generate **task progress graphs, deadline timelines, and team activity heatmaps**.
* Provide **digestible summaries** of large discussions or meeting notes.

**Optimized Database with Indexed Storage**

* Implement a **scalable database (PostgreSQL, MongoDB, or Elasticsearch)** for faster lookups.
* Store past queries and responses for quick access and learning.

## Implementation Mockup v0.1

A screenshot of a computer

Description automatically generated

## Prompt Catalog

<https://chatgpt.com/c/679e1e85-10c4-800a-84cb-85ef16930efc>