# **High-Level Design Document**

**Freeform Text Generation for Content Creators Project**

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## Document Control

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## 1. Introduction

This document provides a High-Level Design (HLD) for the Freeform Text Generation for Content Creators project. It aims to provide a broad understanding of the system's architecture, components, and overall design, detailing how different modules interact to accomplish text generation tasks for content creators.

## 2. Project Overview

The Freeform Text Generation project is designed to generate natural language sentences based on specified concepts using the meta-llama/Llama-2-7b-chat-hf model. This system is intended to assist content creators by generating sentences that incorporate provided concepts in a coherent and contextually relevant manner.

## 3. Scope

The scope of this HLD is to outline the architecture and primary modules of the system, including data preprocessing, model management, text generation, and evaluation components. The HLD emphasizes the system's design, data flow, and major interactions without diving into low-level implementation details.

## 4. System Architecture

The architecture of the system is modular, with each component responsible for a specific task. The system relies on a pretrained Llama-2-7b-chat model and comprises modules for data preprocessing, model management, text generation, and evaluation. Each module interacts with others to ensure a smooth workflow from input concept sets to output sentences.

## 5. Modules Overview

### Data Preprocessing Module

This module prepares concept sets by cleaning and formatting them for model input, ensuring compatibility and consistency. It includes functionality for removing suffixes (e.g., 'catch\_V' -> 'catch').

### Model Module

This module handles loading and configuring the Llama-2-7b-chat model. It formats prompts to be suitable for natural language generation and manages memory usage.

### Text Generation Module

This module generates sentences based on provided prompts, ensuring that all specified concepts are present. It also validates the output to ensure coherence and concept inclusion.

### Evaluation Module

This module assesses the quality of generated sentences using metrics like BERTSCORE. It provides feedback to help improve the quality of the text generation.

## 6. Data Flow Diagram

The data flow for the Freeform Text Generation system involves the following stages:  
1. Concept Data Input  
2. Data Preprocessing (Clean and Format)  
3. Prompt Generation and Model Input  
4. Text Generation and Validation  
5. Evaluation and Feedback

## 7. Technology Stack

The primary technologies used in this project include:  
- \*\*Programming Language\*\*: Python  
- \*\*Libraries\*\*: Transformers, Torch, Datasets  
- \*\*Model\*\*: meta-llama/Llama-2-7b-chat-hf  
- \*\*Evaluation Metrics\*\*: BERTSCORE  
- \*\*Environment\*\*: Colab/Kaggle (for GPU processing)

## 8. Error Handling and Dependencies

Error Handling:  
- GPU Memory Management: Monitor and manage GPU memory usage, implementing batch processing as needed.  
- Concept Validation: Ensure that all required concepts are present in generated sentences, regenerating output if necessary.  
  
Dependencies:  
- \*\*Transformers Library\*\*: For model handling  
- \*\*Torch Library\*\*: For deep learning and GPU support  
- \*\*Datasets Library\*\*: For dataset handling and preprocessing

## 9. Conclusion

This HLD document provides a comprehensive view of the Freeform Text Generation project’s design and structure. With a modular and efficient design, this system leverages the Llama-2-7b-chat model to generate natural language sentences that incorporate specified concepts. By ensuring clear data flow, effective module interactions, and thorough error handling, the system is designed to meet the objectives of content generation for creators.