**TRƯỜNG ĐẠI HỌC TRÀ VINH**

**TRƯỜNG KỸ THUẬT & CÔNG NGHỆ**



**ISO 9001:2015**

**ĐINH TẤN MÃI**

**XÂY DỰNG HỆ THỐNG THEO DÕI DỰ ÁN**

**PHẦN MỀM LÀM VIỆC NHÓM CỦA SINH VIÊN QUA GITHUB ACTION**

**KHÓA LUẬN TỐT NGHIỆP**

**NGÀNH CÔNG NGHỆ THÔNG TIN**

**Vĩnh Long, tháng…..năm…….**

**TRƯỜNG ĐẠI HỌC TRÀ VINH**

**TRƯỜNG KỸ THUẬT & CÔNG NGHỆ**



**ISO 9001:2015**

**XÂY DỰNG HỆ THỐNG THEO DÕI DỰ ÁN**

**PHẦN MỀM LÀM VIỆC NHÓM CỦA SINH VIÊN QUA GITHUB ACTION**

**KHÓA LUẬN TỐT NGHIỆP**

**NGÀNH CÔNG NGHỆ THÔNG TIN**

Giảng viên hướng dẫn: **TS NGUYỄN BẢO ÂN**

Sinh viên thực hiện: **ĐINH TẤN MÃI**

Mã số sinh viên: **110121063**

Lớp: **DA21TTB**

Khoá: **2021**

**Vĩnh Long, tháng…..năm…….**

LỜI MỞ ĐẦU

Trong bối cảnh học tập và phát triển phần mềm hiện đại, việc làm việc nhóm và sử dụng các công cụ phát triển như GitHub ngày càng trở nên phổ biến trong môi trường đào tạo ngành Công nghệ thông tin. Tuy nhiên, một thách thức đặt ra là làm thế nào để giảng viên có thể theo dõi hiệu quả quá trình làm việc nhóm, đánh giá mức độ đóng góp của từng sinh viên cũng như kiểm tra chất lượng mã nguồn một cách khách quan và tự động.

GitHub Actions, GitHub API và Webhook là những công cụ mạnh mẽ hỗ trợ quá trình kiểm tra và đánh giá mã nguồn, được GitHub cung cấp miễn phí với khả năng tích hợp linh hoạt. Khi kết hợp với quy trình CI/CD, chúng tạo thành một hệ thống tự động hoá toàn diện từ nộp bài đến phân tích chất lượng và thống kê đóng góp. Việc ứng dụng các công cụ này không chỉ giúp nâng cao chất lượng đào tạo mà còn giúp sinh viên làm quen với quy trình phát triển phần mềm chuyên nghiệp ngay từ khi còn trên ghế nhà trường.

Đề tài này hướng tới việc xây dựng một hệ thống hỗ trợ giảng viên và sinh viên theo dõi tiến độ dự án phần mềm làm việc nhóm thông qua GitHub. Hệ thống cho phép sinh viên đăng nhập bằng GitHub OAuth, nộp bài qua repository riêng, tự động đánh giá chất lượng mã thông qua GitHub Actions và SonarCloud, đồng thời thống kê mức độ đóng góp của từng thành viên nhóm. Đây là giải pháp thiết thực nhằm nâng cao hiệu quả học tập, giảng dạy và đánh giá trong các môn học liên quan đến phát triển phần mềm.

LỜI CẢM ƠN

Em xin bày tỏ lòng biết ơn chân thành và sâu sắc nhất đến Thầy – Tiến sĩ Nguyễn Bảo Ân, Giảng viên Khoa Kỹ thuật & Công nghệ, Trường Đại học Trà Vinh , người đã trực tiếp hướng dẫn em trong suốt quá trình thực hiện đồ án tốt nghiệp.

Trong suốt thời gian thực hiện đề tài, Thầy không chỉ là người định hướng về mặt chuyên môn mà còn là người luôn đồng hành, động viên và hỗ trợ em vượt qua những khó khăn, vướng mắc cả trong học thuật lẫn trong quá trình triển khai thực tế. Thầy đã tận tình góp ý, đưa ra những lời khuyên xác đáng, đồng thời luôn tạo điều kiện thuận lợi để em có thể hoàn thiện đề tài một cách tốt nhất.

Bằng kiến thức sâu rộng, tinh thần trách nhiệm cao và sự tận tụy với sinh viên, Thầy đã giúp em không chỉ hiểu rõ hơn về chuyên môn mà còn học hỏi thêm nhiều kỹ năng thực tiễn và cách tư duy logic trong giải quyết vấn đề. Những buổi trao đổi, phản biện và định hướng từ Thầy là những trải nghiệm quý báu, giúp em hoàn thiện hơn từng bước trong quá trình làm đồ án.

Em cảm thấy vô cùng may mắn và trân trọng khi được Thầy hướng dẫn. Những kiến thức và kinh nghiệm học được từ Thầy chắc chắn sẽ là hành trang quý giá để em áp dụng và phát triển trong chặng đường sắp tới.

Một lần nữa, em xin gửi đến Thầy lời cảm ơn chân thành, kính chúc Thầy luôn mạnh khỏe, công tác tốt và tiếp tục truyền cảm hứng, kiến thức cho nhiều thế hệ sinh viên tiếp theo.

Sinh viên thực hiện

**Đinh Tấn Mãi**

NHẬN XÉT

*(Của giảng viên hướng dẫn trong đồ án, khóa luận của sinh viên)*

**Giảng viên hướng dẫn**

*(Ký và ghi rõ họ tên)*

UBND TỈNH VĨNH LONG **CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM**

**TRƯỜNG ĐẠI HỌC TRÀ VINH Độc lập – Tự do – Hạnh Phúc**

**BẢN NHẬN XÉT ĐỒ ÁN, KHÓA LUẬN TỐT NGHIỆP**

*(Của giảng viên hướng dẫn)*

Họ và tên sinh viên:……………………………….. MSSV:……………………

Ngành:…………………………………………….. Khóa:……………………..

Tên đề tài: …………………………………………………………………………..

……………………………………………………………………………………….……………………………………………………………………………………….………………………………………………………………………………………

Họ và tên Giáo viên hướng dẫn:…………………………………………………….

Chức danh: ……………………… …..Học vị: …………………………………….

**NHẬN XÉT**

1. Nội dung đề tài:

1. Ưu điểm:

1. Khuyết điểm:

1. Điểm mới đề tài:

1. Giá trị thực trên đề tài:

7. Đề nghị sửa chữa bổ sung:

8. Đánh giá:

Vĩnh Long*, ngày tháng năm 20…*

Giảng viên hướng dẫn

*(Ký & ghi rõ họ tên)*

NHẬN XÉT

*(Của giảng viên chấm trong đồ án, khóa luận của sinh viên)*

**Giảng viên hướng dẫn**

*(Ký và ghi rõ họ tên)*

UBND TỈNH VĨNH LONG **CỘNG HOÀ XÃ HỘI CHỦ NGHĨA VIỆT NAM**

**TRƯỜNG ĐẠI HỌC TRÀ VINH Độc lập – Tự do – Hạnh Phúc**

**BẢN NHẬN XÉT ĐỒ ÁN, KHÓA LUẬN TỐT NGHIỆP**

*(Của cán bộ chấm đồ án, khóa luận)*

Họ và tên người nhận xét: …………………………………………………………..

Chức danh:………………………………………….. Học vị:………………………

Chuyên ngành:……………………………………………………………………….

Cơ quan công tác:……………………………………………………………………

Họ và tên sinh viên:………………………………………………………………….

Tên đề tài đồ án, khóa luận tốt nghiệp:………………………………………………

……………………………………………………………………………………….……………………………………………………………………………………….……………………………………………………………………………………….

**I. Ý KIẾN NHẬN XÉT**

1. Nội dung:

1. Điểm mới các kết quả của đồ án, khóa luận:

1. Ứng dụng thực tế:

**II. CÁC VẤN ĐỀ CẦN LÀM RÕ**

(Các câu hỏi của giáo viên phản biện)

**III. KẾT LUẬN**

(Ghi rõ đồng ý hay không đồng ý cho bảo vệ đồ án khóa luận tốt nghiệp)

Vĩnh Long*, ngày …..tháng….. năm 20…*

Người nhận xét

*(Ký & ghi rõ họ tên)*

MỤC LỤC

[CHƯƠNG 1. ĐẶT VẤN ĐỀ 1](#_Toc205317669)

[1.1. Lý do chọn đề tài 1](#_Toc205317670)

[1.2. Mục tiêu 1](#_Toc205317671)

[1.3. Nội dung nghiên cứu 1](#_Toc205317672)

[1.4. Đối tượng và phạm vi nghiên 2](#_Toc205317673)

[1.5. Phương pháp nghiên cứu 2](#_Toc205317674)

[CHƯƠNG 2. CƠ SỞ LÝ THUYẾT 3](#_Toc205317675)

[2.1. Tổng quan về GitHub và làm việc nhóm qua GitHub 3](#_Toc205317676)

[2.2. Giới thiệu CI/CD và GitHub Actions 3](#_Toc205317677)

[2.3. Tổng quan về GitHub API và Webhook 3](#_Toc205317678)

[2.4. Công cụ đánh giá mã nguồn: SonarCloud 4](#_Toc205317679)

[2.5. Tổng quan về hệ thống đánh giá lập trình tự động 4](#_Toc205317680)

[2.6. Các công nghệ sử dụng trong hệ thống 4](#_Toc205317681)

[2.6.1 Quy trình tạo môn học, đề tài, nhóm 5](#_Toc205317682)

[2.6.2 Quy trình kết nối GitHub, nhận webhook 5](#_Toc205317683)

[2.6.3 Quy trình nộp bài và đánh giá mã nguồn tự động 5](#_Toc205317684)

[2.6.4 Quy trình hiển thị thống kê đóng góp 6](#_Toc205317685)

[CHƯƠNG 3. HIỆN THỰC HÓA NGHIÊN CỨU 7](#_Toc205317686)

[3.1. Mô tả bài toán thực tế 7](#_Toc205317687)

[3.2. Phân tích yêu cầu người dùng 7](#_Toc205317688)

[3.3. Lựa chọn công nghệ 7](#_Toc205317689)

[3.4. Thiết kế kiến trúc hệ thống tổng thể 7](#_Toc205317690)

[3.5. Thiết kế cơ sở dữ liệu 7](#_Toc205317691)

[3.6. Thiết kế các luồng hoạt động chính của hệ thống 7](#_Toc205317692)

[3.6.1 Quy trình tạo môn học, đề tài, nhóm 7](#_Toc205317693)

[3.6.2 Quy trình kết nối GitHub, nhận webhook 7](#_Toc205317694)

[3.6.3 Quy trình nộp bài và đánh giá mã nguồn tự động 7](#_Toc205317695)

[3.6.4 Quy trình hiển thị thống kê đóng góp 7](#_Toc205317696)

[CHƯƠNG 4. Triển khai hệ thống 8](#_Toc205317697)

[4.1. Thiết lập môi trường phát triển 8](#_Toc205317698)

[4.2. Xây dựng backend với Express và Sequelize 8](#_Toc205317699)

[4.3. Xây dựng các API chức năng chính 8](#_Toc205317700)

[4.3.1 API người dùng và xác thực OAuth 8](#_Toc205317701)

[4.3.2 API môn học, đề tài, nhóm 8](#_Toc205317702)

[4.3.3 API webhook và xử lý commit từ GitHub 8](#_Toc205317703)

[4.3.4 API thống kê đóng góp 8](#_Toc205317704)

[4.4. Thiết kế và xây dựng giao diện bằng Next.js 8](#_Toc205317705)

[4.4.1 Giao diện giảng viên 8](#_Toc205317706)

[4.4.2 Giao diện sinh viên 8](#_Toc205317707)

[4.5. Thiết lập GitHub Actions và tích hợp SonarCloud 8](#_Toc205317708)

[4.6. Tích hợp toàn bộ hệ thống và xử lý dữ liệu thời gian thực 8](#_Toc205317709)

[CHƯƠNG 5. KẾT QUẢ VÀ ĐÁNH GIÁ 9](#_Toc205317710)

[5.1. Kết quả thử nghiệm với tài khoản sinh viên 9](#_Toc205317711)

[5.2. Kết quả thử nghiệm với tài khoản giảng viên 9](#_Toc205317712)

[5.3. Kiểm tra kết quả đánh giá mã nguồn qua GitHub Actions 9](#_Toc205317713)

[5.4. Đánh giá tính chính xác và hiệu quả thống kê đóng góp 9](#_Toc205317714)

[CHƯƠNG 6. KẾT LUẬN VÀ HƯỚNG PHÁT TRIỂN 10](#_Toc205317715)

[6.1. Kết luận 10](#_Toc205317716)

[6.2. Hạn chế 10](#_Toc205317717)

[6.3. Hướng phát triển trong tương lai 10](#_Toc205317718)

[PHỤ LỤC 11](#_Toc205317719)

[DANH MỤC TÀI LIỆU THAM KHẢO 12](#_Toc205317720)

DANH MỤC CÁC BẢNG, SƠ ĐỒ, HÌNH

[Ảnh 1.1 Placeholder.svg 2](#_Toc203916953)

KÍ HIỆU CÁC CỤM TỪ VIẾT TẮT

|  |  |
| --- | --- |
| **Từ viết tắt** | **Ý nghĩa** |
|  |  |
|  |  |
|  |  |
|  |  |

# 

# ĐẶT VẤN ĐỀ

## Lý do chọn đề tài

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Mục tiêu

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Nội dung nghiên cứu

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Đối tượng và phạm vi nghiên

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Phương pháp nghiên cứu

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

# CƠ SỞ LÝ THUYẾT

## Tổng quan về GitHub và làm việc nhóm qua GitHub

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Giới thiệu CI/CD và GitHub Actions

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Tổng quan về GitHub API và Webhook

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Công cụ đánh giá mã nguồn: SonarCloud

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Tổng quan về hệ thống đánh giá lập trình tự động

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Các công nghệ sử dụng trong hệ thống

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### Quy trình tạo môn học, đề tài, nhóm

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### Quy trình kết nối GitHub, nhận webhook

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### Quy trình nộp bài và đánh giá mã nguồn tự động

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### Quy trình hiển thị thống kê đóng góp

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

# HIỆN THỰC HÓA NGHIÊN CỨU

## Mô tả bài toán thực tế

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Phân tích yêu cầu người dùng

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Lựa chọn công nghệ

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Thiết kế kiến trúc hệ thống tổng thể

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Thiết kế cơ sở dữ liệu

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Thiết kế các luồng hoạt động chính của hệ thống

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### Quy trình tạo môn học, đề tài, nhóm

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### Quy trình kết nối GitHub, nhận webhook

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### Quy trình nộp bài và đánh giá mã nguồn tự động

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### Quy trình hiển thị thống kê đóng góp

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

# Triển khai hệ thống

## Thiết lập môi trường phát triển

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Xây dựng backend với Express và Sequelize

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Xây dựng các API chức năng chính

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### API người dùng và xác thực OAuth

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### API môn học, đề tài, nhóm

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### API webhook và xử lý commit từ GitHub

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### API thống kê đóng góp

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Thiết kế và xây dựng giao diện bằng Next.js

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### Giao diện giảng viên

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

### Giao diện sinh viên

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Thiết lập GitHub Actions và tích hợp SonarCloud

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Tích hợp toàn bộ hệ thống và xử lý dữ liệu thời gian thực

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

# KẾT QUẢ VÀ ĐÁNH GIÁ

## Kết quả thử nghiệm với tài khoản sinh viên

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Kết quả thử nghiệm với tài khoản giảng viên

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Kiểm tra kết quả đánh giá mã nguồn qua GitHub Actions

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Đánh giá tính chính xác và hiệu quả thống kê đóng góp

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

# KẾT LUẬN VÀ HƯỚNG PHÁT TRIỂN

## Kết luận

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Hạn chế

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

## Hướng phát triển trong tương lai

**Lorem Ipsum** is simply dummy text of the printing and typesetting industry. Lorem Ipsum has been the industry's standard dummy text ever since the 1500s, when an unknown printer took a galley of type and scrambled it to make a type specimen book. It has survived not only five centuries, but also the leap into electronic typesetting, remaining essentially unchanged. It was popularised in the 1960s with the release of Letraset sheets containing Lorem Ipsum passages, and more recently with desktop publishing software like Aldus PageMaker including versions of Lorem Ipsum.

PHỤ LỤC

DANH MỤC TÀI LIỆU THAM KHẢO