

# AI Tutor

---

*Technical Report*

**Spencer Thompson**

## Table of Contents

1.	Introduction	2
1.1.	Background	2
1.1.1.	Context	2
1.1.2.	Purpose	2
1.2.	Scope	2
1.2.1.	Goals	2
1.2.2.	Limitations	2
2.	Design	2
2.1.	Data	2
2.1.1.	Analytics	2
2.1.2.	Pipeline	2
2.1.3.	Storage	2
2.2.	Security	2
2.3.	AI Behavior	2
3.	Implementation	2
3.1.	Infrastructure	3
3.2.	Frontend	3
3.2.1.	Browser Extension	3
3.2.2.	Chat Interface	3
3.3.	Backend	3
3.3.1.	AI	3
3.3.2.	Tools	3
3.3.3.	Telemetry	3
3.4.	Database	3
4.	Challenges	3
4.1.	Permissions	3
4.2.	API Inconsistency	3
4.2.1.	Canvas LMS	3
4.2.2.	Plausible Analytics	4
4.3.	Messy Data	4
4.3.1.	Live Service	4
5.	Solutions	4
5.1.	Workarounds	4
5.2.	Clever Tricks	4
5.2.1.	Authentication	4
6.	Conclusion	4
6.1.	Findings	4
6.2.	Implications	4

# **1. Introduction**

## **1.1. Background**

- Version 2
- Complete rewrite

### **1.1.1. Context**

- AI Hype

### **1.1.2. Purpose**

- Custom personalized tutoring
- 24/7 access

## **1.2. Scope**

### **1.2.1. Goals**

### **1.2.2. Limitations**

- Other opportunities
- A very difficult semester

# **2. Design**

- Browser Extension

## **2.1. Data**

### **2.1.1. Analytics**

### **2.1.2. Pipeline**

### **2.1.3. Storage**

## **2.2. Security**

- JWT
- Keys
- SSH
- 2FA?

## **2.3. AI Behavior**

- Class specific behavior / answers

# **3. Implementation**

- Lessons Learned from first iteration

### **3.1. Infrastructure**

- Hetzner VPS
- Cost reduction
- Docker & Compose

### **3.2. Frontend**

- User Interface
- Prioritize good User Experience

#### **3.2.1. Browser Extension**

- Side panel
- Cookies

#### **3.2.2. Chat Interface**

- Streamlit

### **3.3. Backend**

- FastAPI

#### **3.3.1. AI**

- OpenAI API

#### **3.3.2. Tools**

- Catalog
- Upcoming Assignments
- Grades

#### **3.3.3. Telemetry**

- Plausible Analytics

### **3.4. Database**

- MongoDB
- Document Based

## **4. Challenges**

### **4.1. Permissions**

- UVU
- Competing Team

### **4.2. API Inconsistency**

#### **4.2.1. Canvas LMS**

- Name vs Course Code

#### **4.2.2. Plausible Analytics**

- Weirdest API I have ever seen
- Cartesian products galore

### **4.3. Messy Data**

- Canvas
- My own Design

#### **4.3.1. Live Service**

- Developing / Adding features for an application in use is difficult

## **5. Solutions**

### **5.1. Workarounds**

- Browser Extension

### **5.2. Clever Tricks**

#### **5.2.1. Authentication**

- JWT / Cookie

## **6. Conclusion**

### **6.1. Findings**

### **6.2. Implications**