Proposed Solution Report

Design and Creative Technologies

Torrens University, Australia

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Subject Code: HCD 402

Subject Name: Research Methodologies

Assessment No.: 2

Title of Assessment: Proposed Solution Report

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Date: Nov 2025

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1. Introduction

It is impossible not to hear about AI agents nowadays, we read about them on the news, saying Artificial Intelligence is replacing our jobs, we read about people talking about them on LinkedIn ('Comment 'AGENT' on this post to receive the step by step'). The picture below demonstrates the increase of search on that term on the past 2 years (Jan 2023 – Oct 2025):

Fig 1 – Google Trends (https://trends.google.com/trends/explore?date=2023-01-01%202025-10-16&geo=AU&q=ai%20agent&hl=en)
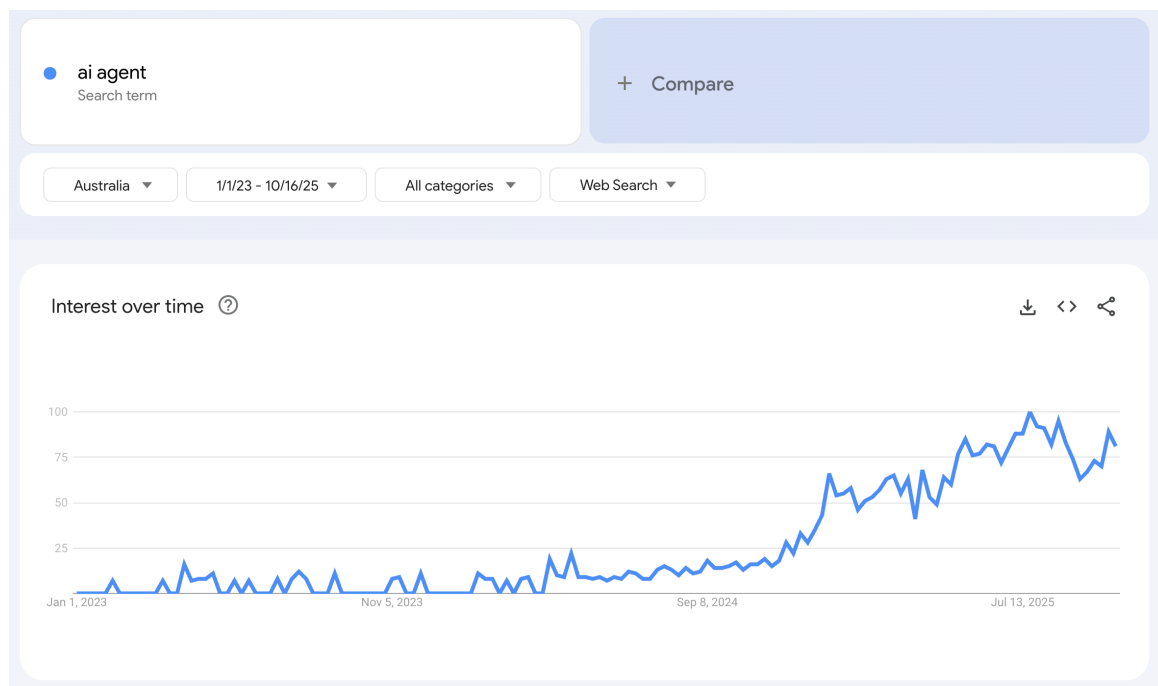
Based on that crazy demand, for the proposed assignment of Human-Centred Design subject at Torrens University, being lectured by Dr. Omid Haas, I have decided to write this Proposed Solution Report with the following characteristics:

- **Technology:** Agentic AI systems (autonomous AI agents making API calls)

- **Undermining Effect:** Uncontrolled resource consumption, API abuse, economic/security risks.

- **Proposed Solution:** Intelligent Rate Limiting & Resource Management system using Node.js + GraphQL + Redis.

I intend to bring the reader deep with me on the benefits and contradictions of having AI as our workers and discuss on the fact that companies are losing thousands of dollars (not to mention reputation) on uncontrolled AI agent API calls. We'll discuss about OpenAI, Anthropic, AWS solutions implemented and we'll also dip our toes on the waters of a possible Node.JS + Apollo Server + Redis solution development that will challenge and deepen our knowledge with a cutting edge API system built using advanced Redis patterns, Graph QL subscriptions for real-time monitoring, Entreprise grade middleware architecture and distributed systems design.

This will demonstrate system design at scale, security engineering, performance optimization, real-time systems and research to production link. I hope you enjoy the trip below. It has been interesting to write about this.

2. Development of Technology

Timeline 2017-2024

- 17-19: Early AI Assistants (chatbots, simple automation)

- 20-22: GPT-3 enables more autonomous behavior

- 23-24: Full agentic systems (AutoGPT, LangChain agents, etc.)

Main Effects:

Positive	Questionable
Automation of complex work flows	Uncontrolled API consumption
Enhanced productivity and decision-making	Resource exhaustion attacks
24/7 autonomous operations	Economic inequality (who can afford unlimited API access)

Development outcomes

- Inspired microservices architecture evolution

- Led to serverless computing adoption

- Drove need for better API management

Ethical Complications

- Who's responsible when an agent causes harm?

- How to prevent malicious agent deployment?

- Fair resource allocation among users

3. Release and Immediate Undermining Effects

The AI revolution era is extremely complicated to detail because so much has happened in such a small amount of time and I've fit in the paragraphs below the most remarkable milestones I could categorize in. If the reader is curious, I have put an extensive list of references and studies I've read on Appendix A.

3.1. Release Timeline

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- **2022-2023:** ChatGPT plyginsm AutoGPT, BabyAGI
- **2023-2024:** LangChain, OpenAI Assistants API, Anthropic Claude agents
- **2024-2025:**

3.2. Immediate Issues Identified

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- **Week 1:** ChatGPT plyginsm AutoGPT, BabyAGI
- **Week 2:** LangChain, OpenAI Assistants API, Anthropic Claude agents
- **Week 3:**

3.3. Industry Response

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- **Week 1:** ChatGPT plyginsm AutoGPT, BabyAGI
- **Week 2:** LangChain, OpenAI Assistants API, Anthropic Claude agents
- **Week 3:**

3.4. Speed of Issue Identification

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- **Week 1:** ChatGPT plyginsm AutoGPT, BabyAGI

- **Week 2:** LangChain, OpenAI Assistants API, Anthropic Claude agents

- **Week 3:**

This creates a research opportunity: to test whether AI-driven sentiment analysis of patient feedback can predict business outcomes such as revenue, retention, and referrals. The availability of large-scale patient feedback data (e.g., NPS and sentiment scores across 27,000 records) alongside store-level revenue metrics further underscores the feasibility of empirically exploring this correlation in future research.

4. Long-Term Undermining Effects

If we consider the timeframe of the analysis, it is still very recent and as stressed previously, so much has happened in such a small amount of time that it is even hard for us to process. Once again, I'm covering the general area of study with the amount of time we have available for the proposed assessment and I'll discuss briefly about the following themes: Economic Impact, Security & Abuse, Performance Degradation, Social Impact, Long-term Adjustments and Restrictions Implemented.

4.1. Economic Impact

- **Cost Explosion:** Startups facing $10K-$100K monthly API bills

- **Barrier to Entry:** Only well-funded companies can afford agentic systems

- **Market Consolidation:** Large players dominate due to API access advantages

4.2. Security and Abuse

- **Scrapping Attacks:** Automated agents extracting entire datasets

- **Credentials Stuffing:** Agents testing stolen credentials at scale

- **Resource Monopolization:** Single bad actor consuming shared resources

4.3. Performance Degradation

- **Shared Infrastructure Strains:** API services becoming slower

- **Cascading Failures:** One agent's misbehavior affecting all users

- **Quality of Service Issues:** Legitimate users getting throttled

4.4. Social Impact

- **Digital Divide:** Those who can afford AI agents vs those who can't

- **Job Displacement:** Automation without safeguards

- **Trust Erosion:** Services becoming unreliable

4.5. Long-term Adjustments

Positive	Negative
Rate limiting becoming standard (2023-2024)	Still no standardized solution across platforms
Cost-based pricing models emerging	No global governance framework

4.6. Restrictions Implemented

- OpenAI: Tier 1-5 rate limits (2023)

- Anthropic: Usage tiers and quotas (2024)

- Microsoft Azure: Token bucket + sliding window (2024)

- AWS: Enhanced API Gateway throttling (2024)

Blabla blab la bla.

5. Proposed Solution

The existing solutions that I could find and/or worked in the past are:

1. Simple Rate limiting: fixed requests/minute (too rigid)

2. Token Bucket: Better but no context awareness.

3. Usage Quotas: Monthly limits (doesn't prevent burst attacks)

This led me to propose a solution: An Intelligent Multi-Tier Rate Limiting System. Details follow below:

5.1. Core Innovation

The solution will be context-aware, adaptive rate limiting using Redis + GraphQL.

5.2. Solution Components

The solution will be context-aware, adaptive rate limiting using Redis + GraphQL and the technology chosen for the development is Node.js + Redis using sorted sets..

Component	Features
Adaptive Rate Limiting Engine	- Real-time traffic analysis - Behavior pattern detection - Dynamic threshold adjustment - User reputation scoring

Multi-Dimensional Throttling	• Per-user limits • Per-endpoint limits • Per-resource-type limits • Time-based limits (hour/day/month) • Cost-based limits ($ spent)
Fair Resource Allocation	• Priority queue system: critical requests bypass throttling • Weighted fair qeueing: important users get higher quotas • Backpressure mechanism: Gradual slowdown vs hard cutoff
Intelligent Circuit Breaking	• Health monitoring: detect service degradation • Graceful degradation: reduce limits when system is stressed • Auto-Recovery: Gradually restore capacity
Analytics & Monitoring Dashboard	• Real-time metrics: GraphQL subscriptions • Abuse detection: ML-powered anomaly detection • Coast projection: Predict monthly spend according to usage.

5.3   Technical Architecture

(add technical architecture)

6. Conclusion

(add conclusion)

Appendices A – Release Timeline

https://www.searchenginejournal.com/history-of-chatgpt-timeline/488370/

https://en.wikipedia.org/wiki/ChatGPT

https://timelines.issarice.com/wiki/Timeline_of_ChatGPT

https://timelines.issarice.com/wiki/Timeline_of_Anthropic

Statement of Acknowledgment

I acknowledge that I have used the following AI tool(s) in the creation of this report:

- OpenAI ChatGPT (GPT-5): Used to assist with outlining, refining structure, improving clarity of academic language, and supporting with APA 7th referencing conventions.

I confirm that the use of the AI tool has been in accordance with the Torrens University Australia Academic Integrity Policy and TUA, Think and MDS's Position Paper on the Use of AI. I confirm that the final output is authored by me and represents my own critical thinking, analysis, and synthesis of sources. I take full responsibility for the final content of this report.

7. References

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