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Formal Specification of Aptitude Architecture for Recommendation and Adaptation of Learning Contents and Activities Based on Learning Analytics

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Introduction

- standardized system that combines data from different platforms
- Methodology definition
- Semantic modelling
- Data analysis
- Learning courseware enhancement and platform development
- Validation

Aptitude project
Designs the platform for adaptation and recommendation of learning contents and activities based on learning and gaming analytics.

Introduction

- standardized system
- data exchange
- human-readable and machine-readable data
- communication protocol

Aptitude project
Designs the platform for adaptation and recommendation of learning contents and activities based on learning and gaming analytics.

Paper goals

- a meta-model and a formal model of software architecture for the recommendation and adaptation of learning content and activities based on learning analytics.
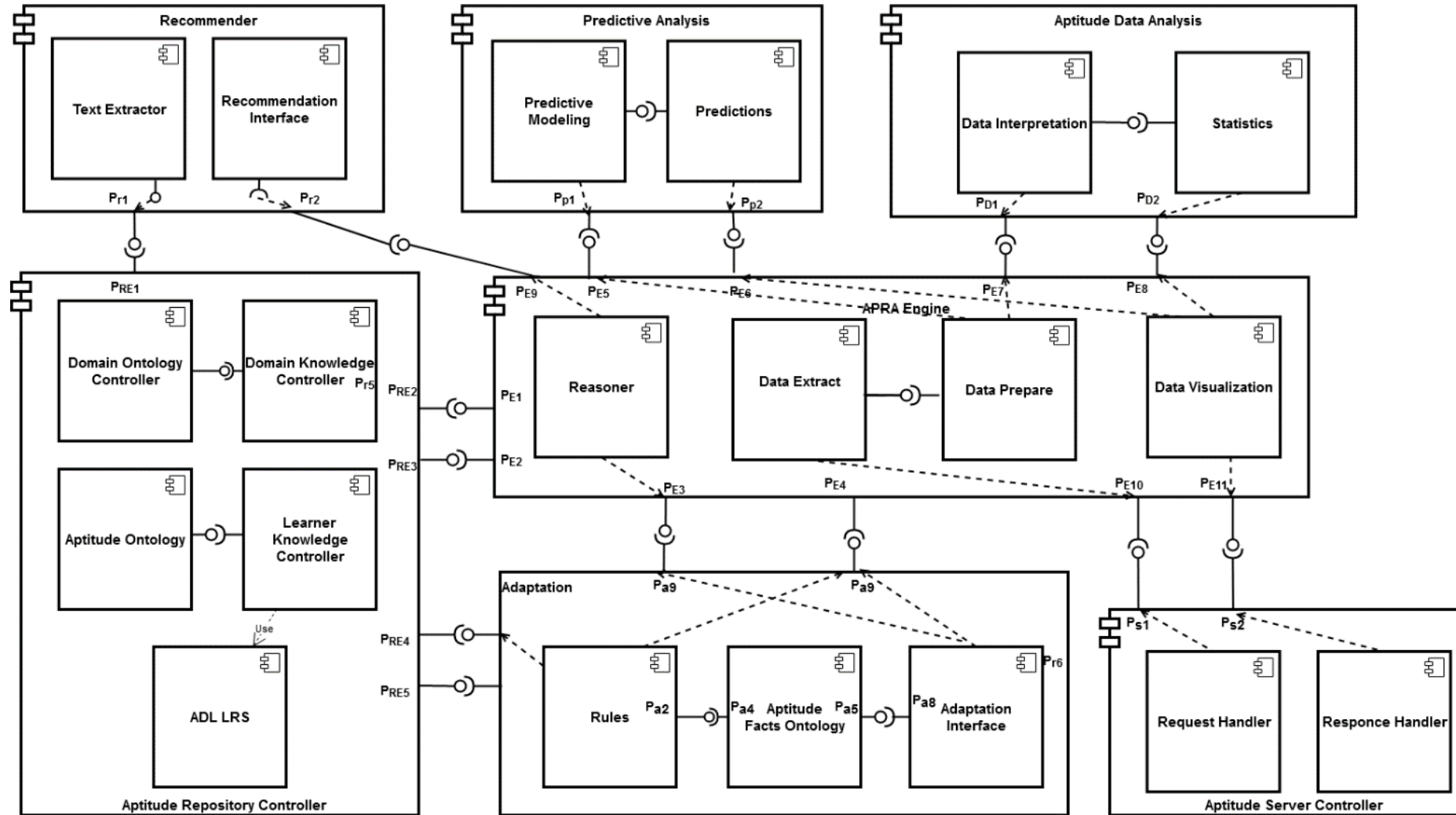- a proof-of-concept implementation of the model which allows validation of the system architecture.

Methodology
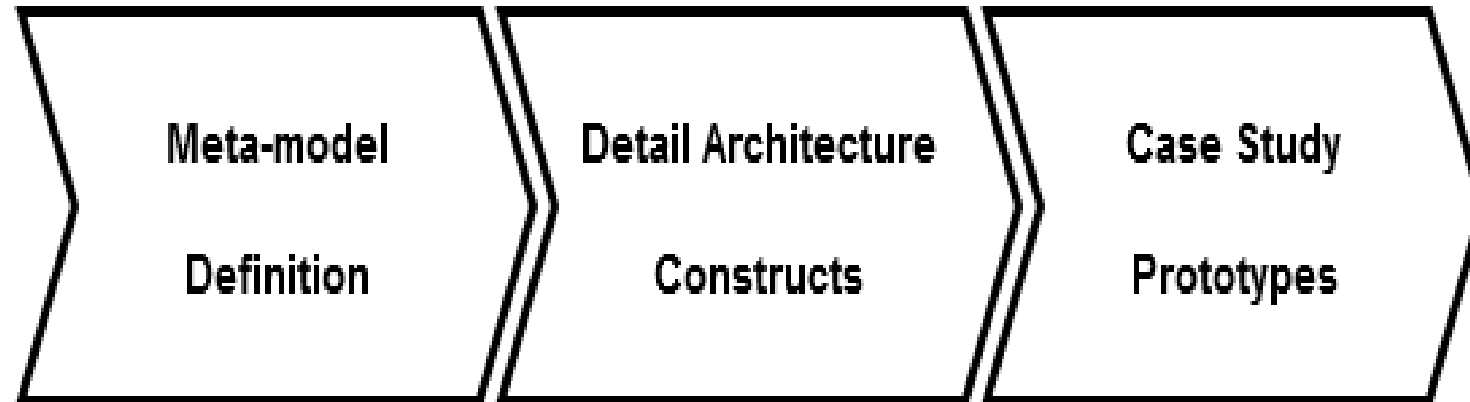
Meta-model of Aptitude System Architecture

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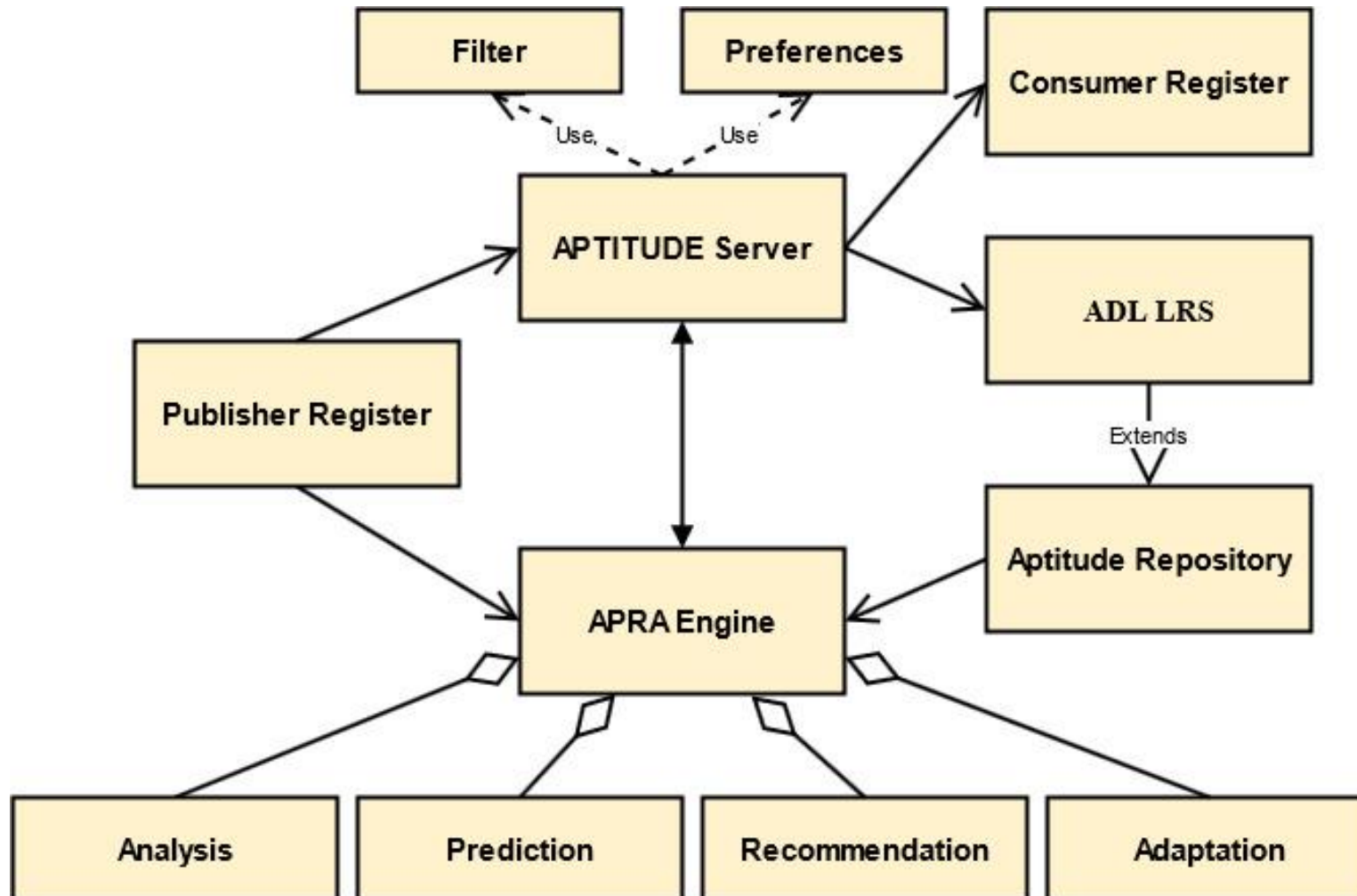
Detailed Architecture Constructs

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Case Study

- Learning Record Store - the reference implementation of ADL LRS has been chosen for the purpose of building this infrastructure, as it has a demonstration purpose.
- Source(s) of training data - the Moodle training platform has been selected. It is widely used, has many plugins, including LogStore xAPI, which helps Moodle become a Data Source for LRS.
- Data visualization software stored in LRS - Software called LRS Viewer must be implemented to extract xAPI "expressions" from ADL LRS.

Module organization
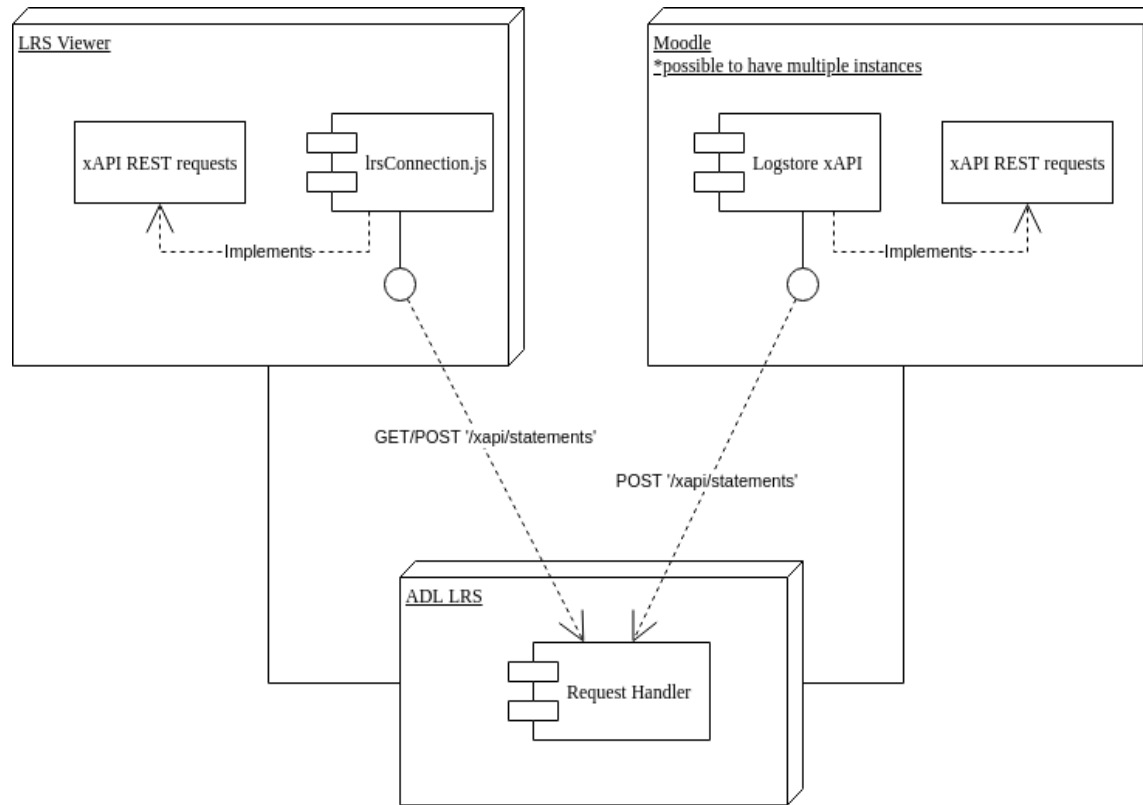
LRS Viewer

- Visualization of xAPI "expressions" in an easy-to-read format.
- Table paging to increase the usability of the resulting table.
- Data filtering to facilitate search.
- Exporting data contained in the ADL LRS in order to be able to create archives.
- Importing a file with xAPI "expressions" from LRS Viewer to ADL LRS. This will allow for a possible backup recovery in the event of a failure in the ADL LRS.
- Caching of LRS data.

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Workflow of xAPI "expressions"

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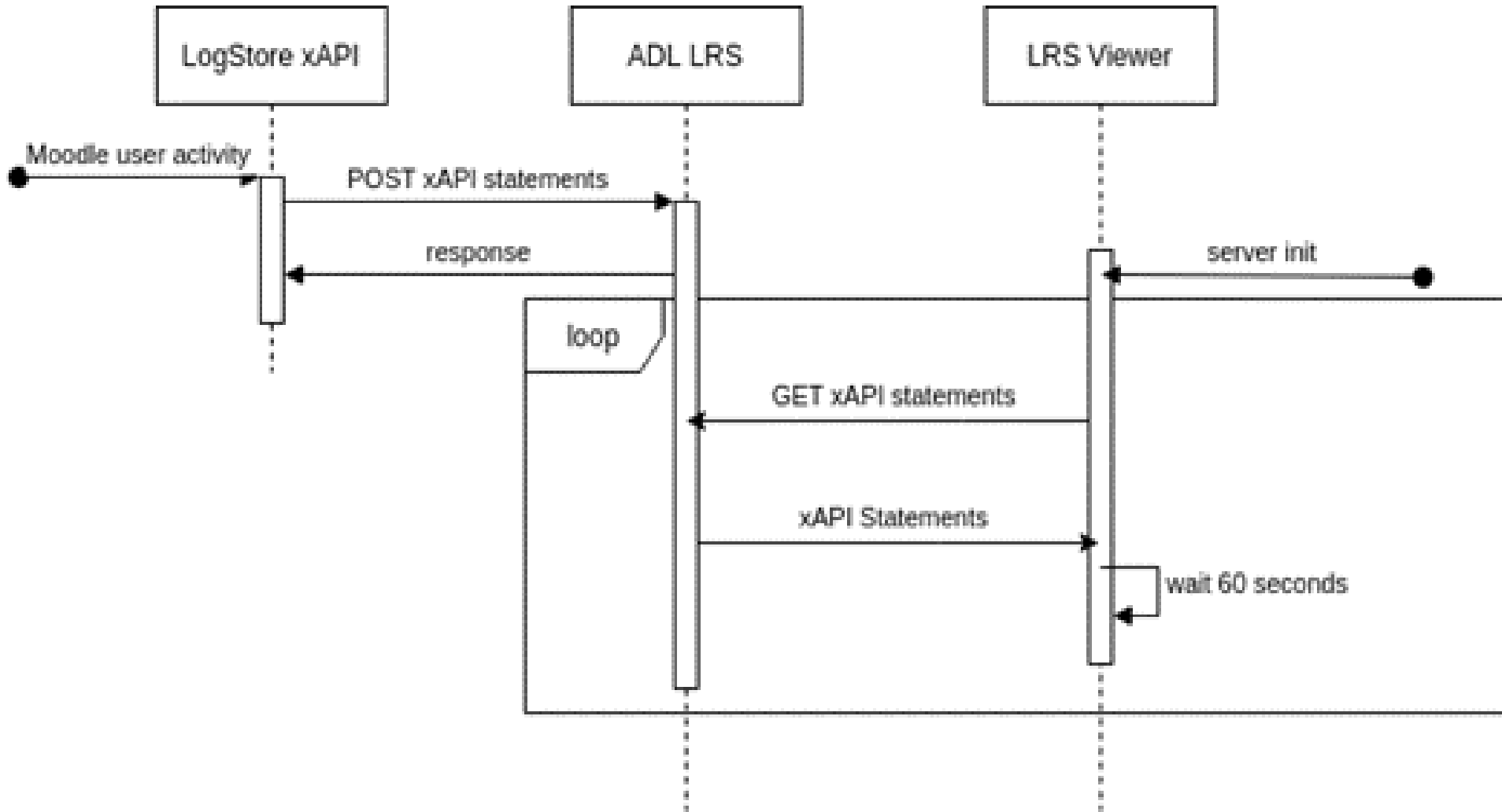
Conclusion

The main objective of the proposed architecture is to build a flexible infrastructure for the adaptation and recommendation of learning content and activities based on data analysis for learners:

- to allow the integration of different types of educational systems, tools, services, and games, which can be both data sources and consumers of services.
- To allow the analysed data related to training to be extended through ontologies and defined rules.
- To ensure an independent form of recommendation and adaptation by predicting both the learning content and the sequence of learning activities.

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Acknowledgment

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Thank you!

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