

**DEVELOPMENT OF A KNOWLEDGE GRAPH MODEL FOR  
RESOURCE MANAGEMENT IN E-LIBRARY**

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**NOVEMBER, 2021**

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RESOURCE MANAGEMENT IN E-LIBRARY**

**BY**

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**A DISSERTATION SUBMITTED TO THE DEPARTMENT OF COMPUTER AND  
INFORMATION SCIENCES, COVENANT UNIVERSITY OTA, IN PARTIAL  
FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF MASTER OF  
SCIENCE IN COMPUTER SCIENCE**

**NOVEMBER, 2021**

## **ACCEPTANCE**

This is to attest that this dissertation was accepted in partial fulfillment of the requirements for the award of Master of Science (M.Sc) degree in Computer Science in the Department of Computer and Information Science, College of Science and Technology, Covenant University, Ota, Ogun State, Nigeria.

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## **DECLARATION**

I, **AKINWUMI, HANNAH** with matriculation number **18PCG02024**, hereby declare that this dissertation entitled **DEVELOPMENT OF A KNOWLEDGE GRAPH MODEL FOR RESOURCE MANAGEMENT IN E-LIBRARY** was carried out by me under the supervision of Prof. Ambrose A. Azeta. This dissertation is an original study in the Department of Computer and Information Sciences, College of Science and Technology, Covenant University, Ota, Nigeria. I attest that the dissertation has not been presented either wholly or partially for the award of any degree elsewhere. All scholarly information used in this study is fully acknowledged.

**HANNAH AKINWUMI**

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**Signature and Date**

## CERTIFICATION

This is to certify that the dissertation titled “**DEVELOPMENT OF A KNOWLEDGE GRAPH MODEL FOR RESOURCE MANAGEMENT IN E-LIBRARY**” was carried out by **AKINWUMI, HANNAH** with matriculation number **18PCG02024** under the supervision of Prof. Ambrose A. Azeta in the Department of Computer and Information Science, College of Science and Technology, Covenant University, Ota, Ogun State.

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**Signature and Date**

## **DEDICATION**

This dissertation is dedicated to the Producer of the ‘movie’ of my life, the Ultimate Deliverer, the Way Maker, the Capable One, the King over all storms, the All Sufficient One, the Father of the fathers and the Father to the fatherless, the Great Provider, the Ever-loving One, the Never-erring but Forgiver of all sins, and the Timeless One that is always right on time - the Almighty God.

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## ABSTRACT

Electronic libraries grant communities access to electronic resources, aiding information seekers to acquire knowledge and utilize them for various purposes. The ambiguity of the natural language that makes it difficult to get a perfect match between a user's query and resources or document is an inherent challenge to any information retrieval system that deals with text. Techniques from information visualization like knowledge graph will be valuable to describe collections can optimize information retrieval services in several aspects such as recommendation and reference services. Some library users do not know how to search for the resources and materials they need. Some other categories of users come with only ideas to the library looking for resources. There are also case where librarians have to sources for materials to archive at the reference section of the library. This study provided a knowledge graph model of resources in E-library, boosted the information search and facilitated information retrieval more efficiently. This study collected dataset from an academic database and preprocessed after which the dataset was Transformed to Java Script Object Notation (JSON). The Resource Description Framework (RDF) modeled the data using turtle syntax to generate the schema. Entity and relationship was extracted with RDF Turtle syntax then the data was stored in MongoDB. The knowledge graph constructed by Coding Staple API GraphQL. The knowledge graph queried the graphql and rendered knowledge graph via Vis.js. HTML, CSS and JS deployed for the front-end user access. The study utilized various technologies, such as MongoDB Atlas, Staple API and Repl.it IDE. A prototype knowledge graph was developed. A five-point Likert scale was used for the system's evaluation. The attributes evaluated were user satisfaction, efficiency and learnability. The average scores obtained for the user satisfaction, efficiency and learnability were 4.70, 4.21 and 3.71, respectively. The scores show that the users rated the system high.

**Keywords:** Electronic library, Electronic resources, Graphql, Knowledge graph, Ontology, Semantics.