Development of biography information system based on semantic web using biography ontology: Requirement phase

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Abstract. The development of the research world is increasingly proven by the integration of supporting technologies, including applications for referral processes, data processing, online journals, journal indexes, and many other applications. Some of these applications, of course, apply web technologies including the semantic web. The purpose of this study is to know which areas of interest and research are being or have been done, provide explanations related to the fields of research, education, personal, awards and a number of other things. This study develops biographical ontologies that are applied to biographical information systems using qualitative methods of analyzing the requirement of biographical ontologies and developing biographical ontology models. The results of this study are the initial phases in the form of the requirement for biographical ontologies that are implemented in biographical ontology models and represent representations of biographical information system designs.

1. Introduction
The advancement of technology allows the semantic web to make it easy for us to collect, decipher, and search for information in detail in various parts of the world. One important information is related to biographical information. The information contained in the biography can be in the form of a name, place of residence, date of birth, nationality, occupation, political affiliation, organization, and the institution of employment [1]. Biographical information can be mapped according to usability in terms of history, time, activities and demographics based on location [2]. Some organizations develop biographical information systems, both Open Source Software (OSS) and commercial [3]. The information system created in relation to the biographical information system does not fully implement the web semantics. Semantic web basically applies ontology, not an only database. The thing that distinguishes between ontology and database is that ontology not only applies relational models and database schemes but also special schemes and represents data using JSON with XML schemas. Ontology is a model that clarifies and sets a set informal language. The database scheme defines the database structure in formal languages in 3 ways, namely conceptual, physical and logical [4].

Integrated information systems supporting technology, including information systems for referral processes, processing data, online journals and journal indexes related to biographical data. In an institution knowing the field of interest of lecturers, lecturer research areas, personal lecturer researchers, lecturer associations and awards so far have not had any connection between one another and related to the Tri Dharma of Higher Education. If there is, the information displayed is only informative, so the data cannot be reprocessed or has more meaning and has interrelationships with one another. To enrich
and link biographical data with several other data which are interrelated by transforming data so that it is aligned for example using Dublin Core (DC) and Friend of a Friend (FOAF) [5].

Biographies of knowledge are formed according to the lecturers’ personal lives. Content is related to the most personal. The focus starts with the most basic data on making biographical data. As an example of information with very common time, it is difficult to find real-world web services that are related. For example, the date is time sensitive data [6].

Several papers have examined biographical ontologies and information systems related to biography but not yet deeply into the biographical information system using ontology. Therefore, in this paper propose the development of biography-based ontology biographical information systems.

The contribution of this research will provide an overview of the initial process to develop a biography information system by applying the ontology biography to the phase of requirement. Structure of this paper is next after the introduction is in part two describes the method in the study, in section three shows the results of the study along with several things that can be discussed, stage four contains conclusions and last stage acknowledgment.

2. Method

The stages in developing biography information systems are clearly stated as follow:

2.1. Analysis requirement of biography ontology

Building biographical ontologies there are several very important entities including data from: personality entities, work entities, educational entities, relatives, associates, competent entities, expertise entities, identify entities, award entities, teaching entities, service entities, and time entities. Ontology is built above or around someone by using a class and then expanded into sub-classes. Properties are defined using the ontology relationship between entities with each other [7].

2.2. Design class biography information systems

The design of the biographical information system class will be developed using a biographical ontology model domain. This model provides a comprehensive representation of the knowledge that will be formed and is needed to define and interpret knowledge in standard vocabulary and relevant ontology by following best practices in developing new open knowledge bases so that existing and related data can be linked [8].

3. Results and discussion

3.1. Requirements of biography ontology

Requirements of biography ontology there are several items related to the biographical data taken and can then be changed in the form of questions as the competence of questions to design the biographical ontology model domain. There are ten items related to biographical data including:

| No. | Selected item                  |
|-----|--------------------------------|
| 1.  | Person                         |
| 2.  | Work                           |
| 3.  | Education                      |
| 4.  | Competence                     |
| 5.  | Experience                     |
| 6.  | Organization / Association     |
| 7.  | Teaching                       |
| 8.  | Appreciation                   |
| 9.  | Research                       |
| 10. | Identity                       |
Then ten items related to biographical data can be asked as follows:

Table 2. Questions related to biographical ontology.

| No. | Selected item |
|-----|---------------|
| 1.  | First name, middle name, your last name? |
| 2.  | What job do you pursue? |
| 3.  | List of education history, where do you go to school? |
| 4.  | What competencies and skills do you have? |
| 5.  | Owned experience? |
| 6.  | Ever joined an organization or association? |
| 7.  | Teaching in fields or courses? |
| 8.  | Award ever received? |
| 9.  | Research is being done? |
| 10. | Ownership, do you have an account with Sinta, Scopus, Google Scholar? |

The table of questions can be adjusted to the desired ontology form, according to the information system needs to be developed later.

3.2. Domain model of ontology biography
From the analysis of needs and questions regarding biographical ontology forms an entity. Henceforth it is designed a relationship between entities that later represents the interrelationships between entities. The results of the design of the biography ontology model domain can be seen in figure 1 below.

![Figure 1. Domain model of ontology biography.](image)

This domain will be used as the basis for developing an ontology-based biography information system. The application of ontology makes information systems have a collection of standards, data structures, and software that enhance a more and smarter online experience so that information can have mutual attachments [9,10].

3.3. Discussion of research results
The results showed that there were several items needed in the development of biographical ontologies including data: People, Employment, Education, Competence, Experience, Organization / Association,
Teaching, Awards, Research and Identity. The item needs can still be increased according to the system requirements. Furthermore, these needs are made a question related to the data. After developing the need for biographical ontology, the next step is to build a domain of biographical ontology models that represent the interrelationships between each entity in the domain of biographical ontology models.

4. Conclusion
Based on the results of the research and discussions that have been conducted, the development process uses two stages including the first, namely analyzing the requirements of biographical ontology and second, designing the class of biography ontology systems or biographical ontology model domains. Furthermore, the results of the study are ten biographical data which will later be developed into biographical entities on the development of the ontology model domain.

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