

# Studio Apartment Domain Ontology Development

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## Abstract

For people who go to Bali to continue their education or work on work projects, they definitely need a place to stay while in Bali. Not infrequently many people choose to rent studio apartments because what is offered is sufficient for them to live in. However, from the many studio apartment options available, it makes it difficult for them to choose a studio apartment that matches the criteria for the facilities they want. Therefore, ontology can be used to provide information related to studio apartments explicitly by using a semantic ontology approach, because ontologies can store more complex data and can apply data-links, so that data can be integrated into various systems that have similar domains. Studio apartment ontology that is built with 9 classes, 4 object properties, and 14 individuals.

**Keywords:** SPARQL query, Ontology, Studio apartment, Protégé, Methontology

## 1. Introduction

Bali is one of the provinces in Indonesia with its capital in Denpasar. Bali is well-known as a tourism destination with its unique arts and culture. Bali is also known as the Island of the Gods and the Island of a Thousand Temples. Bali is the prima donna of tourism which is well known throughout the world. For people who go to Bali to continue their educational studies or work projects, they definitely need a place to stay while in Bali. Not infrequently many of them choose to rent a studio apartment because the facilities offered are quite adequate for them to live in Bali. The studio apartment itself is a type of rental room that is rented (booked) for a certain period following the room owner's agreement and the agreed price. Generally, room bookings are made for one year. However, some only rent for one month, three months, and six months, so that the terms become annual, monthly, tri-monthly, and semi-annual rent [1]. This will be the right choice to find a temporary place to stay in Bali while doing the activities you are doing. However, due to a large number of studio apartment options available, it makes it difficult for them to choose a studio apartment that matches the criteria they want. Quoted from news.detik.com<sup>1</sup> page regarding the article "Susahnya cari kos di kampus udayana Jimbaran bali", the article mentioned the difficulty of finding studio apartments for newcomers, the lack of information about places that provide these services, and the difficulty of finding a studio apartment that matches the desired criteria. One solution that can be used to overcome this problem is with ontology, ontology is an information representation technique that can express information explicitly and semantically in a structured and semi-structured manner [2]. Ontologies bridge the gap to allow communication between the various application systems and facilitate the interoperability between different systems by providing a shared understanding of a domain [3]. From the research conducted by [4] Based on this study, it was concluded that the advantage of semantics is the shorter time it takes to obtain the information sought. Also, the use of ontology is a good thing because it can apply data links so that data can be integrated into various systems that have similar domains.

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<sup>1</sup> <https://news.detik.com/berita/d-4479562/susahnya-cari-kos-di-kampus-udayana-jimbaran-bali>

## **2. Research Methods**

The method used in this research is the method of METHONTOLOGY, METHONTOLOGY is a method of developing an ontology model based on the relationship between objects, according to [5] the METHONTOLOGY can develop existing ontologies if it is in the same domain so that it can be used again to develop further systems. The stages of the METHONTOLOGY method will be made based on the steps in the research [5], in [6] :

### **2.1. Specification Stage**

The purpose of the specification phase is to produce informal, semi-formal, or formal ontology specification documents written in natural language, each using a set of intermediate representations or using competency questions [6]. At this stage, the authors have distributed questionnaires to 30 people. In the questionnaire, the author asks about what facilities are offered by the studio apartment that the participants occupied. The question is intended to make it easier for the author to determine the scope and classification of studio apartments.

### **2.2. Knowledge Acquisition Stage**

At the knowledge acquisition stage, the author acquires knowledge with the ontology engineer to prepare a preliminary design of the requirements specifications in building an ontology studio apartment.

### **2.3. Conceptualization Stage**

In this section, the authors conduct a discussion with the ontology engineer to identify terms or concepts that will be used in determining the class, object properties, and individuals for the creation of the ontology studio apartment.

### **2.4. Integration Stage**

At this stage, re-election is carried out regarding the definition of the ontology that is in the concept that has been made

### **2.5. Implementation Stage**

At this stage, the ontology concept that has been created will be applied.

### **2.6. Evaluation Stage**

In the evaluation process, it refers more to the technical process of the ontology itself, evaluation is carried out to see to what extent the ontology's ability has met the requirements and whether it is running as expected [5]. The evaluation uses the SPARQL language, where SPARQL is a query language for RDF / OWL that provides facilities to extract information in the form of URIs, blank nodes, and literals, extract RDF subgraphs and build new RDF graphs based on information from the graphs being queried [7].

### **2.7. Documentation Stage**

There are no specific rules or agreements regarding ontology documentation. Therefore the author will record by writing the ontology on the paper that is made and will publish it in reports and journals that regulate important questions from the built ontology.

## **3. Result and Discussion**

### **3.1. Specification Stage**

The purpose of the specification stage is to produce informal, semi-formal, or formal ontology specification documents written in natural language, each using a set of intermediate representations or using competency questions. The following is a description of Studio apartment ontology.

- a. Domain: Studio apartment
- b. Date: Sept 10, 2020
- c. Conceptualized by: I Gusti Lanang Ary Kresnawan
- d. Implemented by: I Gusti Lanang Ary Kresnawan

- e. Objectives: To build ontology models to facilitate the classification of the studio apartment
- f. Level of Formality: Semi-formal.
- g. Scope: Studio apartement
- h. Knowledge Sources: primary data, secondary data

### 3.2. Knowledge Acquisition Stage

Knowledge acquisition is an independent activity in the ontology development process. The techniques we use in the knowledge acquisition stage of studio apartment ontology are as follows.

- a. Discuss with the ontology engineer to design and develop an initial draft requirements specification document.
- b. Identifies the structure to be detected (definitions, affirmations, etc.) and the type of knowledge each contributes (concepts, attributes, values, and relationships).

The data used in this study are studio apartments in Bali. The data used is training data obtained from questionnaires that have been previously distributed by the authors, the data used later can be developed according to the data obtained in the field.

### 3.3. Conceptualization Stage

In compiling terms or concepts that will be used to describe the problem and its solution in terms of vocabulary in the studio apartment domain in the ontology specification activity which will later be described in the form of classes, objects, and properties in the ontology.

### 3.4. Integration Stage

In this stage the author considers the use of definitions that have been built into the ontology again, the author will consider choosing a meta-ontology that is more in line with the concept. The aim is to ensure that the use of the chosen definition can coherent with the purpose or meaning of the ontology concept itself.

### 3.5. Implementation Stage

in the implementation phase of the application ontology development used is protege 4.3, Each ontology section is defined according to the results of each stage in METHONTOLOGY, where concepts are defined as classes (Figure 1), ad hoc binary relationships are defined as object properties (Figure 2) and instances are defined as individuals (Figure 3). For example, in Figure 2 there are object properties "Tersedia" with the domain "Fasilitas". This can be interpreted as the domain "Fasilitas" as a subject, "Tersedia" as a predicate, and Individuals in the "Fasilitas" class as objects.

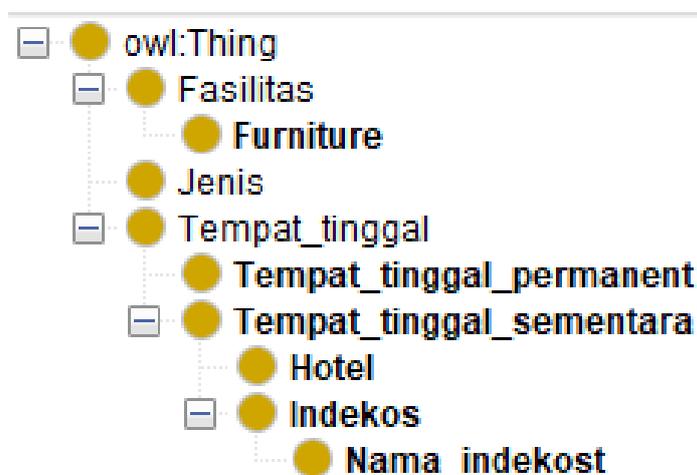


Figure 1: Class of studio apartment ontology



Figure 2: Object properties of studio apartment ontology



Figure 3: Individuals of studio apartement ontology

### 3.6. Evaluation Stage

At this stage, authors try to do the evaluation process by querying the Protege 4.3 application, wherein the query process authors use SPARQL Query. In this query, process authors create a new PREFIX called genealogy with an IRI Ontology address that matches the address in the application protege. Making PREFIX is intended so that the query command that we enter is directed to the file or address that matches the ontology that we have built. At this stage of evaluation, a search was conducted for a studio apartment that had Ac facilities. So that the author executes the query with the command to find "Fasilitas" as the subject with the Ac object and is related to the object property, namely "Tersedia". The results obtained after executing the query are shown in Figure 5. The following are some of the query results that have been carried out:

List of a studio apartment that has “Fasilitas” Ac

```
SPARQL query:
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
PREFIX owl: <http://www.w3.org/2002/07/owl#>
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX xsd: <http://www.w3.org/2001/XMLSchema#>
PREFIX project: <http://www.semanticweb.org/msi/ontologies/2020/5/untitled-ontology-8#>

SELECT ?Nama_indekost
WHERE { ?Nama_indekost project:Tersedia project:Ac }
```

Figure 2: Query Studio apartment that has ac facility

After the query process is carried out above, the query results are as follows

```
Nama_indekost
Indekost_madya
Indekost_ageng
```

Figure 3: Studio apartment query result

### 3.7. Documentation Stage

At this stage, the documentation for the semantic ontology construction of this apartment studio will be written in this report itself.

## 4. Conclusion

Based on the discussion that has been described, it can be concluded as follows. Semantic ontology The search for studio apartments was developed to provide explicit information about studio apartments tailored to user criteria, using data obtained from the results of previous questionnaires. the result data can be expanded to suit actual conditions. This ontology studio apartment built on METHONTOLOGY methodology has 9 classes, 4 object properties, and 14 individuals. Also, the studio apartment ontology can be used as a basis for developing a knowledge system for finding Studio apartments in Bali and other areas. The Ontograph Studio apartment can be seen in (Figure 6).

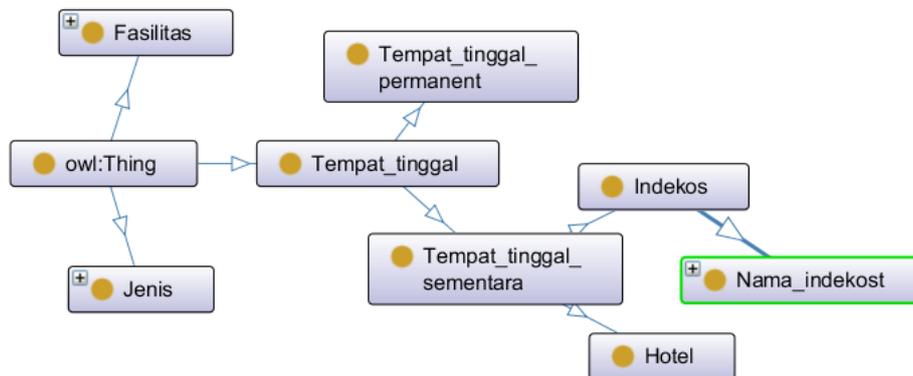


Figure 4. Ontograph of studio apartement

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