

# *semSL*<sup>\*</sup> : Tagging and Data Linking for Second Life<sup>†</sup>

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## ABSTRACT

We present *semSL*, an approach to bring Semantic Web technologies into Second Life. Second Life is a virtual 3D world, in which users can communicate, build objects, and explore the land of other users. There are different kinds of entities in Second Life, which can be locations, objects, or events. Many of these entities are of potential interest to users. However, searching for entities is difficult in Second Life, since there is only a very limited way to describe entities. With *semSL* it becomes possible for every user to add arbitrary tags or key/value pair based descriptions to entities in Second Life, or to create typed links between entities. Such typed links can even be established between entities in Second Life and resources from the Semantic Web. The description data for all such entities is centrally stored at a server external to Second Life. The data is encoded in RDF, and is publicly accessible via a SPARQL endpoint. This should not only lead to significant improvements for searching operations, but will also allow for flexible data integration between data from *semSL* and data from other sources on the Semantic Web.

## 1. INTRODUCTION

Second Life (SL) is a virtual 3D world, which is partitioned into interconnected land regions that can be explored by SL users. Within SL, a user is represented by an “avatar”, which is an animated person-like figure. Land is generally covered by objects created or bought by the land region’s owners.

Often, objects in SL mirror things which exist in the real world. For example, Fig. 1 shows a robot in SL doing some sorting operation. This virtual robot was actually connected to its physical counterpart doing this sorting job at our research institute. SL is used to advertise and trade all kinds of virtual objects, and often this comes along with real money transactions. Many large companies now have a representation in SL.

Although needed, describing objects and searching for them have traditionally been difficult tasks in SL. What appears to a user as, for example, a house is technically seen only a collection of linked geometrical objects, i.e. SL has no internal representation for the concept of a house. The ability to describe such objects is mostly limited to the object’s name and a short fulltext description.

<sup>\*</sup>*semSL* project homepage: [1]

<sup>†</sup>Second Life [2] is a trademark owned by Linden Lab.



Figure 1: A screenshot of Second Life. In the front one can see the user’s avatar, looking at a robot sorting disks. In the background there are trees, houses, and other objects belonging to the land region which represents Baden Wuerttemberg.

With *semSL*, we introduce a method for adding arbitrary tags, key/value pairs and typed links to entities in SL, such as objects or locations. Users of SL will be able to tag the location where they currently stay, or to tag objects, which are intended by their respective owners to get tagged. The tags are stored at a central data server, and the whole tagging data can be retrieved from that server later again.

## 2. SEMSL FUNCTIONALITY

*semSL* goes beyond traditional tagging practices by allowing the use of “triple tags”, which optionally have a namespace and a value. For example, the triple tag “`dc:creator=Peter`” consists of the plain tag “`creator`”, the namespace “`dc`”, and the value “`Peter`”.

While people may still decide to only use plain tags for tagging, adding a namespace helps them to associate a certain meaning with a tag. Although such a meaning for a namespace tag is in no way assumed or enforced by *semSL*, we hope that triple tags will lead to the evolution of useful “standard” tagging vocabularies over time, and to the adoption of already existing widespread Semantic Web vocabularies, such as Dublin Core or FOAF.



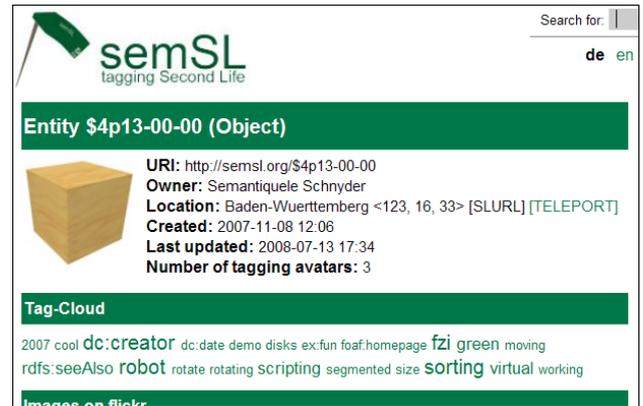
**Figure 2: Tagging in semSL.** *Upper left:* The semSL-HUD is worn at the user’s head up display, and is used for tagging the avatar’s current location. *Upper right:* Taggets have the form of a flag, and are attached to objects, for which they are intended to receive tags. *Below:* Tags are added to an entity via SL’s chat line.

Adding a value can be useful to give more specific information to a tag. Values may be strings, numbers, or URIs. URIs can be used to build typed links pointing from an entity in SL to an arbitrary resource in the Semantic Web. In particular, tagged SL entities themselves are automatically given a URI by *semSL*. This so called “*semSL-ID*” permits to build typed links between entities within SL, or to refer to SL entities from within the Semantic Web.

*semSL* provides two different facilities for tagging entities. On the one hand, there is the “*semSL-HUD*” (Fig. 2, upper left), which the user wears on his SL client’s head up display (hence the name), and which permits tagging the user’s avatar’s current location within a radius of 10 meters. The *semSL-HUD* is used for location tagging in the first place. People may interpret the added tags to belong to an object, which is located at the avatar’s position. However, *semSL* has an alternative way to tag an object by means of a “Tagget” (Fig. 2, upper right). If an owner of an object wants this object to be tagged by himself or other people, he can attach a Tagget to this object. User’s can then add tags to the Tagget on behalf of the owner’s object.

Adding tags to objects or locations is performed by writing the tags to SL’s chat line (Fig. 2, below), which is a common way to communicate with objects in SL. The *semSL-HUD* or the Tagget, respectively, sends the received tags to the *semSL* data server, together with additional provenance data, such as the location and the time of tagging.

The *semSL* data server, which is located externally to SL, puts the received tagging data into an RDF triple store. All the server’s data is available via a public SPARQL endpoint. The format of the RDF data is specified by an OWL ontology, which is called the “*semSL-Ontology*”. *semSL* currently only uses the *semSL-Ontology* as a data schema, no reasoning is performed based on it. Users of the *semSL* data may, of course, freely opt to use the *semSL-Ontology* for reasoning tasks.



**Figure 3: A tagged entity’s homepage.** On top, one can see the *semSL-ID* of the entity (“\$4p13-00-00”, an object), together with additional meta data. Below, the tag cloud for this entity is presented. Some of the tags have namespaces. Values of a tag are displayed in a tooltip, when the mouse pointer hovers over that tag (not shown).

For every tagged entity, a convenient webpage is generated based on the entity’s RDF data (Fig. 3). The webpage additionally contains all the RDF data for this entity embedded in the format RDFa. Two further visualizations (not shown here) are created from the RDF data, which present an entity and some of its tags in the context of interlinked other entities: The first of these views has the form of a relationship cloud, while the second one is a map view, showing where these entities are located in SL.

### 3. OUTLOOK

In this paper, we have presented *semSL*, an approach to bring a certain weak form of semantic tagging into Second Life (SL). We are not aware of any other endeavor to combine the technologies of the Semantic Web with those of the 3D Internet. Since the basic concepts behind *semSL* are in no way specific to SL, we expect that *semSL* will be transferable to other virtual worlds in the future, too.

Now that we have created a working proof of concept, we are in the process of making *semSL* publicly available in SL.

### 4. REFERENCES

- [1] *semSL* project homepage, <http://semsl.org>.
- [2] Second Life™ homepage, <http://secondlife.com>.