

# Soulmate

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## 1 Introduction

It is the year 2021. The web is in the air, connecting all brains worldwide, regardless of space and time. Free, independent minds are exchanging messages that transmit real value and feelings. The system is distributed, built by its participants, without any central instance that makes profit by locking up information. The web has been brought to its full potential, connecting people who don't need to know each other in advance match via messages.

How did this happen? *OL1*, an ingenious idea that had been waiting for its time to come for many years, enabled everybody to communicate with anybody, exchanging messages about anything based on a generic and open protocol. The combination of all tasks in all domains opened up new possibilities beyond “social” web applications and marketplaces. Messages can be exchanged on an individual level, connecting content creators with their desired recipients as well as interested recipients with exactly the messages they search for, that stem from creators who fulfil certain properties. People can shout out their thoughts or requests into the world or target their messages to those who fulfil very special requirements. To receive a message, one can fine-filter for the content of interest, or receive anything on a certain topic or from certain authors. There are no longer strict categories: who will receive a message depends on the criteria and rules defined by both sender and recipient. A message is only delivered if all requirements of both parties are fulfilled, ensuring a very high hit quality.

*OL1* spread like a wildfire. It merged all social web applications, marketplaces and dating sites. Now, it was possible to ask a housewife in India for her secrets in preparing a certain dish. You could connect to a bushman in Africa to exchange knowledge about medicine. Grassroots journalism exploded. When important events happened, like-minded people gathered, requested more information from locals and discussed with eye witnesses or the ones with similar experiences. It was possible to find new friends or people to cooperate with not only based on their location and professional history, but also based on personal interests. The music industry was replaced by a well-balanced self-organising system in which artists are paid directly by those who listen to and like their music and a more direct democracy was born, in which everybody was completely equal. Outrageous ideas were spread directly to their ideal recipients.

Section 2 details everything that is needed to implement *OL1*, and Section 3 concludes.

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## 2 Specification

Messages are exchanged according to a well-known loop: the sender creates the message, and one or more recipients receive it. A recipient can answer to it, and the answers can be rated and rewarded accordingly. Depending on its content, the value associated to a message can be positive or negative. For example, a recipient may be payed for receiving advertisement or answering a question, while he might pay himself for valuable information or news articles. Depending on its urgency, a message can be connected to a time limit for answers.

When sending a message, the sender describes himself, the content of the message and the desired properties of the recipient in an hierarchical *workspace*. It is possible to receive messages by specifying filter profiles with a complementary description. The matching between descriptions and filter profiles guarantees a very high hit quality. The protocol to exchange messages is completely open and described in detail below.

### 2.1 Semantic Workspace

Messages and filter profiles are described in a hierarchical, semantic workspace. It consists of *nets* with collections of *nodes* and *trees* with disjoint *branches*. Unlike nets, trees can be re-used within the workspace.

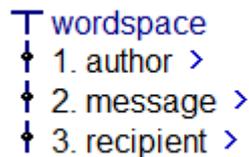


Table 1. Net with Nodes

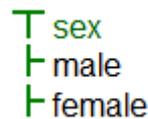


Table 2. Tree with Branches

Figure 1 shows the net that reflects the highest level of the workspace, and consists of the nodes author (sender), message and recipient. Figure 2 shows the gender-tree with its branches male and female.

The workspace is open and extensible, it will evolve according to group consensus. It is possible to re-use well-established terminologies such as geonames<sup>1</sup> for locations.

### 2.2 Rules

Both the sender and the recipient navigate through the workspace, and mark relevant criteria. Each criterion has two standard values which specify how the criterion is treated when it is matched against markings of the other side. Those values are only visible in the “expert mode”. They are the core of our novel

<sup>1</sup> <http://www.geonames.org/>

matchmaking algorithm. We explain the values based on the markings of the sender, those for the filter profile work accordingly. Figure 1 shows exemplary descriptions of a sender and a matching recipient.

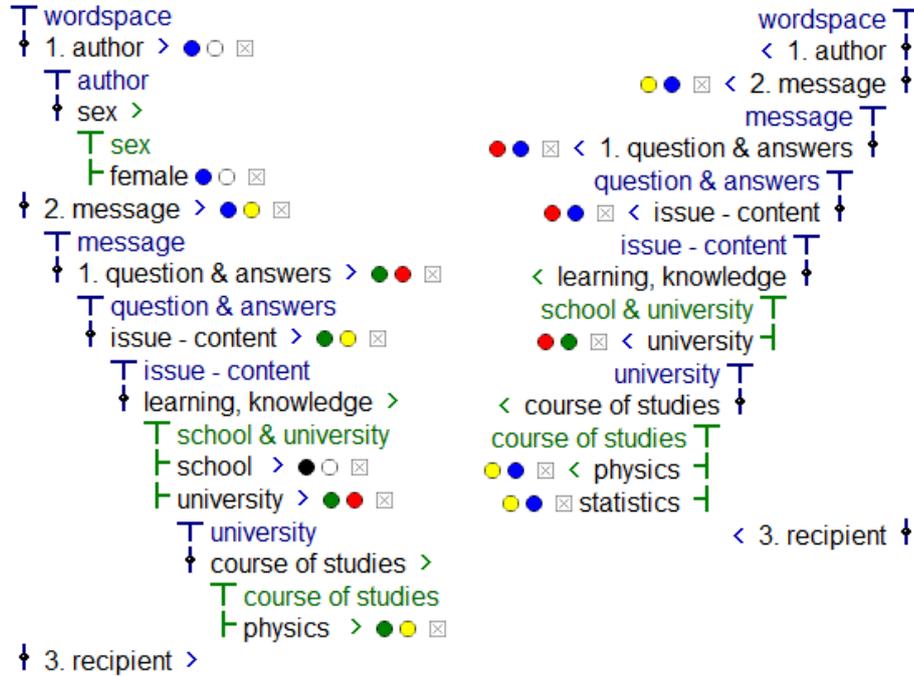


Fig. 1. Matching descriptions of sender and recipient

As shown by the coloured dots in the figure, the first value can be 3 (green), 2 (blue) or 1 (black). The strictest value is 3. It can be used *only once* within a structure, i.e. a net or tree. When the first value is 3, the other side *must* fulfil the requirements of the second value. The first value 2 is less strict and can be used *several times* within a structure, i.e. a net or tree. When the first value is 2, the other side *must* fulfil the requirements of the second value of *at least one* of the selected elements within the structure. When the first value is 1, the other side *must not* have marked that criterion.

The second value can be 3 (red), 2 (yellow), or 0 (white). A message is only delivered to recipients who marked criteria in their filter profile with a first value that is equal to or higher than the second value. When the second value is 0, the marking is a way to be found even when the recipient did not mark this criterion himself. Useful combinations are:

### 2.3 Matchmaking

The matching process matches all descriptions for all messages against all filter profiles. For each pair, it must be ensured that for both sides, all rules that

**Table 3.** Combinations

First Value	Second Value	Explanation
3 	3 	choose only one subdomain e.g. the category <i>university</i>
3 	2 	allow for recipients with multiple choice e.g. the topic <i>physics</i> or <i>mathematics</i>
2 	2 	choose multiple criteria, at least one must be fulfilled e.g. the node <i>message</i>
2 	0 	voluntary marking, no requirements towards the recipient e.g. gender <i>female</i>
1 	-	exclude recipients who marked this criterion e.g. <i>school</i>

have been specified are fulfilled. If this is the case, the message is delivered. The matching algorithm works as follows:

```

comment: nc_xy = number of criteria with first value x, second value y
for sender side and filter side do
  for i := 1 to nc_3y do
    if NOT c(i) on the other side is marked with a first value
      ≥ y then exit fi
  od
  for j := 1 to nc_22 do
    if NOT at the other side, at least one criterion in the same
      structure as c(j) ≥ 2 then exit
    fi
  od
  for k := 1 to nc_1 do
    if c(k) marked on other side then exit fi
  od
od
deliver message

```

The resulting hits of our matching algorithm are very precious, because the interests of both sender and recipient are fulfilled. The matchmaking process is much more fine-grained than traditional matching procedures which combine pre-defined selection criteria of very delimited domains by boolean operators only. A further advantage of this procedure is that a detailed voluntary description (e.g. location) can be queried on a higher level in the hierarchy.

We have developed a reference implementation, an API, Web Services and a Client Application for OL1.<sup>2</sup> Both the wordspace and the domain schema can be exported as RDF Schemata, and all content can be exported as RDF.

### 3 Conclusion

In this paper, we presented an open protocol for a system that takes full advantage of the fact that the world wide web connects all people and ultimately offers each soul the opportunity to find its soulmate.

<sup>2</sup> <http://www.oli-it.com>, <http://nulllogicone.net/>