

MarineTLO-based warehouse Demo Guide

This guide will help you exploit the functionalities of the software that has been developed by FORTH-ICS in the context of the EU iMarine project. Since many of the artifacts are hosted in the iMarine infrastructure we will also provide some details about how to enter the portal and how to register to particular VREs. The structure of this guide is the following: at first we will describe how a user can login in the iMarine portal and how to register in particular VREs. In the sequel we will describe how users can access the contents of the MarineTLO-based warehouse and browse over its contents.

Accessing the iMarine portal

To expose the functionalities of the gCube system to the end users, a presentation layer has been implemented. This layer adopts the portal/portlets paradigm and it is based on the Liferay portal. The portal is accessible at <https://i-marine.d4science.org/>. The homepage of the portal is the following (Figure 1).

The screenshot shows the homepage of the iMarine Gateway. At the top, there is a navigation bar with links for 'Home', 'gCube 3.4.0', and 'about gCube'. The main content area is divided into three columns. The left column contains introductory text about the gateway's purpose and lists various data sources it interfaces with. The middle column features a colorful word cloud with terms like 'gCube e-Infrastructure', 'D4Science', 'Ecosystem', and 'Research'. The right column contains a 'Sign In' form with fields for 'Email Address' and 'Password', a 'Remember Me' checkbox, and buttons for 'Sign In', 'Create Account', and 'Forgot Password'. Below the sign-in form is a 'Join now!' section with a registration policy and a list of bullet points explaining the benefits of joining, such as access to VREs and free-to-use environments.

Figure 1: The homepage of the iMarine portal

If you haven't already registered in the portal then click on "Create Account" to sign up. Make sure that you enter a valid email address, because a verification email will be sent, and

this email is going to be used as your username. After creating (and verifying your email) you will see the following screen.

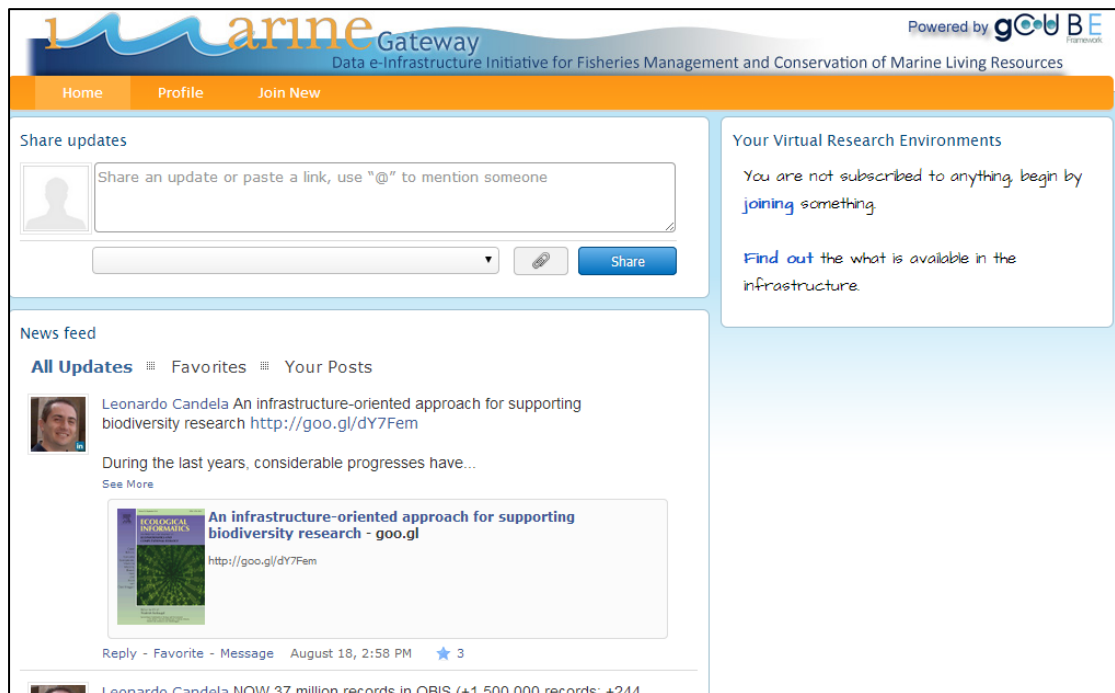


Figure 2: The homepage of iMarine portal

The facilities of iMarine infrastructure are offered through VREs (Virtual Research Environments). Practically this means that you should join a VRE first. As you will notice from Figure 2 (in the upper right) you haven't been subscribed to any VREs yet. By clicking on "Find out" you can see the available VREs (Figure 3).

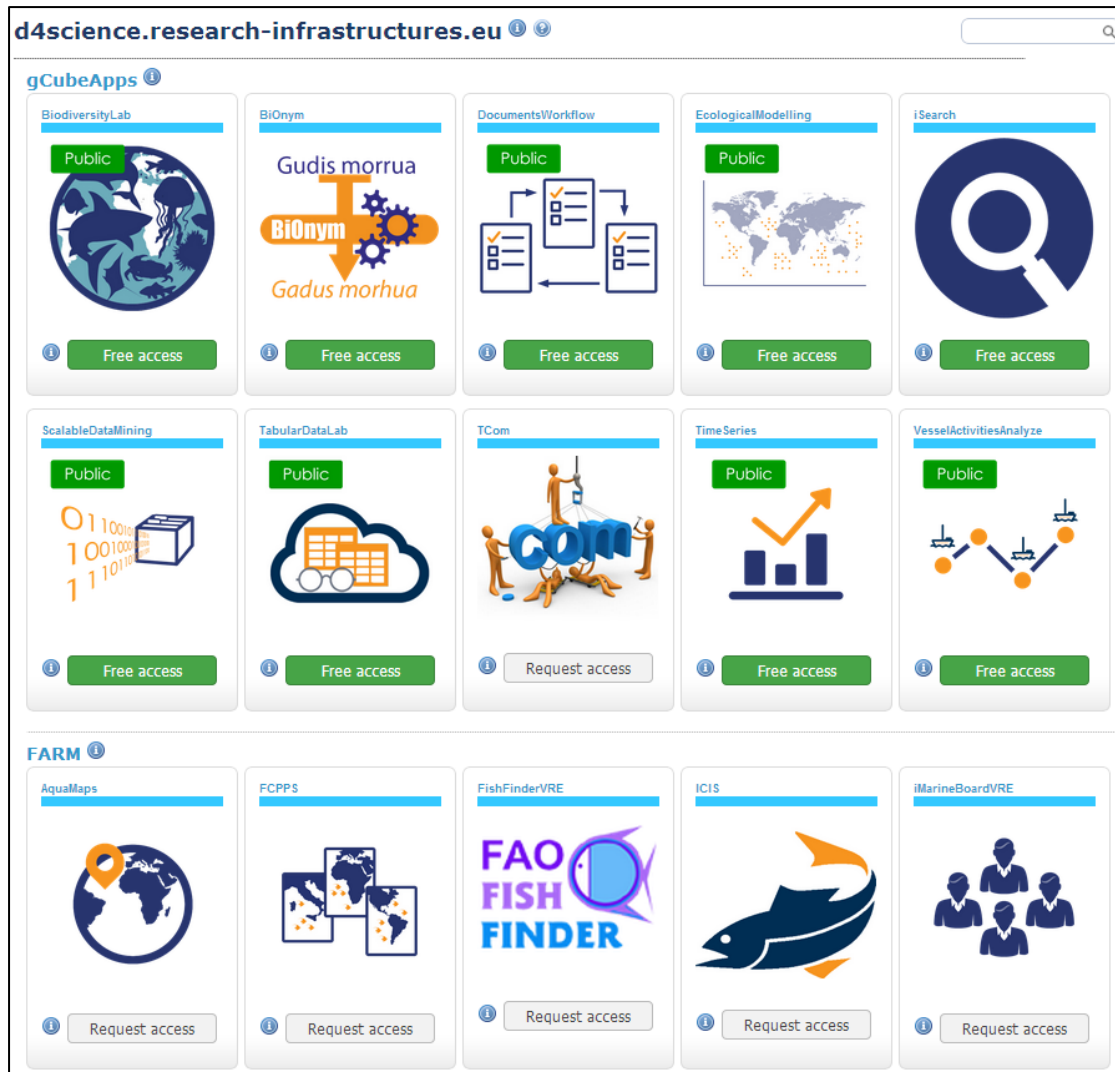


Figure 3: Exploring VREs

You will notice that some VREs have free access (e.g. BioDiversityLab, BiOnym, etc.) while for others you have to submit a request for joining (e.g. AquaMaps, FCPPS, etc.). In the sequel whenever it is requested to join a VRE we will also report the VRE that should be used.

MarineTLO-Based warehouse

Accessing the SPARQL endpoint

The SPARQL endpoint of MarineTLO-based warehouse is accessible from iMarine portal using the following VREs:

- BiodiversityLab
- MarineSearch
- iSearch

In the sequel we are going to use the BiodiversityLab VRE to access the MarineTLO-based warehouse SPARQL endpoint. Note that in other VREs the process might be slightly different.

After joining the Biodiversity lab VRE click on the page “*SPARQL Endpoint*”. The following figure will show up.

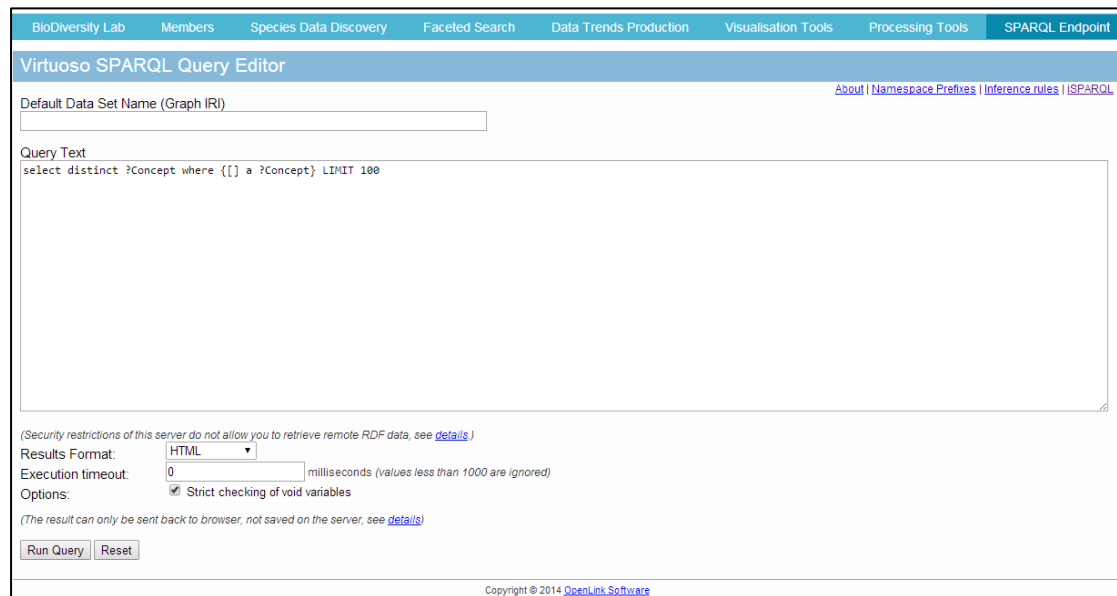


Figure 4: The MarineTLO-based warehouse SPARQL endpoint

There you can submit your SPARQL queries, and define the format of the results. For building the warehouse we have used OpenLink virtuoso. Virtuoso supports an extended syntax for SPARQL queries, allowing users to define if they want to include also the inferred triples for the evaluation of their query. These instructions are the following:

- `define input:same-as "yes"`: This instruction enables the inference of all triples containing the predicate `owl:sameAs` (e.g. `http://www.ecoscope.org/ontologies/ecosystems/thunnus_albacares> owl:sameAs <http://www.marinespecies.org/entity#WoRMS:127027/Thunnus_albacares>`)
- `define input:inference 'http://graphspace'`: This instruction allows inferring triples that have not been physically stored. It recognizes `rdfs:subClassOf`, `rdfs:subPropertyOf`, `owl:equivalentClass`, and `owl:equivalentProperty`. For this reason we have created a rule-set based on the MarineTLO and its mappings.

The following figure searches for the predators of `thunnus_albacares`. The results of the SPARQL query are shown in Figure 5.

```
define input:inference 'http://www.ics.forth.gr/isl/Schema'
define input:same-as 'yes'
prefix tloCore: <http://www.ics.forth.gr/isl/MarineTLO/v4/marinetlo.owl#>
SELECT DISTINCT ?predators WHERE {
  <http://www.ecoscope.org/ontologies/ecosystems/thunnus_albacares>
```

tloCore:LT5_usually_is_predator_of?predators .
 }

predators
http://www.ecoscope.org/ontologies/ecosystems/chiasmodon_niger
http://www.ecoscope.org/ontologies/ecosystems/cubiceps_pauciradiatus
http://www.ecoscope.org/ontologies/ecosystems/gempylus_serpens
http://www.ecoscope.org/ontologies/ecosystems/auxis_thazard
http://www.ecoscope.org/ontologies/ecosystems/canthidermis_maculatus
http://www.ecoscope.org/ontologies/ecosystems/cranchia_scabra
http://www.ecoscope.org/ontologies/ecosystems/decapterus_macarellus
http://www.ecoscope.org/ontologies/ecosystems/sarda_orientalis
http://www.ecoscope.org/ontologies/ecosystems/brama_brama
http://www.ecoscope.org/ontologies/ecosystems/coryphaena_equiselis
http://www.ecoscope.org/ontologies/ecosystems/dactyloptena_orientalis
http://www.ecoscope.org/ontologies/ecosystems/nansenia_macrolepis
http://www.ecoscope.org/ontologies/ecosystems/natosquilla_investigatoris
http://www.ecoscope.org/ontologies/ecosystems/nealotus_tripis
http://www.ecoscope.org/ontologies/ecosystems/neoanchisquilla_tuberculata
http://www.ecoscope.org/ontologies/ecosystems/odontodactylus_scyllarus
http://www.ecoscope.org/ontologies/ecosystems/omosudis_lowei
http://www.ecoscope.org/ontologies/ecosystems/psenes_arafurensis
http://www.ecoscope.org/ontologies/ecosystems/scomberesox_saurus
http://www.ecoscope.org/ontologies/ecosystems/scopelarchus_analis
http://www.ecoscope.org/ontologies/ecosystems/vinciguerra_nimbaria

Figure 5: SPARQL results

Browsing the contents of MarineTLO-based warehouse

Apart from the SPARQL endpoint, the contents of the MarineTLO-based warehouse, are available through the faceted browser (for short FCT). It is available at <http://virtuoso.i-marine.d4science.org:8890/fct/>. Figure 6 shows the initial screen of FCT.

The screenshot shows the 'Precision Search & Find' interface. At the top left is the 'OPEN LINK SOFTWARE' logo. Below it are three tabs: 'Text Search' (selected), 'Entity Label Lookup', and 'Entity URI Lookup'. To the right are links for 'Featured', 'Demo Queries', and 'About'. The main search area has a 'Search Text' input field containing 'tuna' and a 'Search' button. Below the search area is a hint: 'Hint: You can [add this engine](#) in search bar of an OpenSearch - capable browser'. The footer contains the text: 'Faceted Search & Find service v1.11.96', 'POWERED BY VIRTUOSO LINKINGOPENDATA', and 'OpenLink Virtuoso version 06.01.3127, on Linux (x86_64-pc-linux-gnu), Standard Edition'. It also states: 'Data on this page is owned by its respective rights holders. Virtuoso Faceted Browser Copyright © 2009-2012 OpenLink Software'.

Figure 6: The Faceted Search and Find Service

FCT allows searching for triples by entering query terms (it does not require SPARQL syntax). In this example we used the query tuna. The results are shown in Figure 7. The user can start browsing over the returned triples by clicking on them.

The screenshot shows the OpenLink Software interface. At the top, it says "Displaying Ranked Entity Names and Text summaries where: Entity1 has any Attribute with Value "tuna" Drop." Below this, there are navigation options: "View query as SPARQL" and "Facet permalink". A search bar shows "Go to:" followed by a text input field, "Show 20" (with a dropdown arrow), and "1 - 20 of 249 total" (with left and right arrow buttons). The main content is a table with four columns: Entity, Title, Named Graph, and a fourth column containing text summaries. The table lists 12 results, each with a green minus sign in the left margin.

Entity	Title	Named Graph	
http://www.fao.org/f...e-969a-18e340e73e54	Tuna motherships	http://www.ics.forth.gr/isl/FLOD	Tuna motherships.
http://www.fao.org/f...9-8b9d-8a64ad10ef44	Tuna longliners	http://www.ics.forth...asedDataWarehouseV3	Tuna longliners.
http://www.fao.org/f...e-969a-18e340e73e54	Tuna motherships	http://www.ics.forth...asedDataWarehouseV3	Tuna motherships.
http://www.fao.org/f...9-8b9d-8a64ad10ef44	Tuna longliners	http://www.ics.forth.gr/isl/FLOD	Tuna longliners.
http://www.fao.org/f...e-969a-18e340e73e54	Tuna motherships	http://www.ics.forth...asedDataWarehouseV2	Tuna motherships.
http://www.fao.org/f...9-8b9d-8a64ad10ef44	Tuna longliners	http://www.ics.forth...asedDataWarehouseV2	Tuna longliners.
http://www.fao.org/f...4-b968-de5ef4a3ceda		http://www.ics.forth...asedDataWarehouseV3	tuna like fishes nei.
http://www.fao.org/f...4-b968-de5ef4a3ceda		http://www.ics.forth...asedDataWarehouseV3	tuna.
http://www.fao.org/f...4-b968-de5ef4a3ceda		http://www.ics.forth...asedDataWarehouseV2	tuna like fishes nei.
http://www.fao.org/f...4-b968-de5ef4a3ceda		http://www.ics.forth.gr/isl/FLOD	tuna like fishes nei.
http://www.fao.org/f...0-8def-00d37b7bba49		http://www.ics.forth.gr/isl/FLOD	tuna de marhalimeda tuna.
http://www.fao.org/f...0-8def-00d37b7bba49		http://www.ics.forth...asedDataWarehouseV2	tuna de marhalimeda tuna.
http://www.fao.org/f...0-8def-00d37b7bba49		http://www.ics.forth...asedDataWarehouseV3	tuna de marhalimeda tuna.

Figure 7: Results of FCT for query term "tuna"

OPENLINK SOFTWARE

Facets | Description | Metadata | **Settings**

About: Tuna motherships [Sponge](#) [Permalink](#)
 An Entity of Type : http://www.ics.forth.gr/isl/MarineTLO/v4/marinetloimarine.owl#BT11_1_Vessel_Type, within Data Space : virtuoso.i-marine.d4science.org:8890 associated with source [dataset\(s\)](#)

Type: Command:

a Coded Entity

Attributes	Values
rdf:type	http://www.fao.org/figis/flod/onto/codedentity.owl#CodedEntity http://ics.forth.gr/Ontology/MarineTLO/Imarine#VesselType http://www.ics.forth.gr/isl/MarineTLO/v4/marinetloimarine.owl#BT11_1_Vessel_Type
rdfs:label	Tuna motherships
rdfs:comment	a Coded Entity
http://ics.forth.gr/...LX1isIdentifiedBy	11.3.0
http://www.ontolog...isClassifiedByCode	11.3.0
http://www.ics.for... is identified by	11.3.0
is http://www.ontolog...on.owl#classifies of	11.3.0

Alternative Linked Data Views: [iSPARQL](#) | [ODE](#) | Raw Data in: [CXML](#) | [CSV](#) | [RDF](#) ([N-Triples](#) [N3/Turtle](#) [JSON](#) [XML](#)) | [OData](#) ([Atom](#) [JSON](#))
[Microdata](#) ([JSON HTML](#)) | [JSON-LD](#) | [About](#)

OpenLink Virtuoso version 06.01.3127, on Linux (x86_64-pc-linux-gnu), Standard Edition
 Data on this page belongs to its respective rights holders.
 Virtuoso Faceted Browser Copyright © 2009-2012 OpenLink Software

Figure 8: Browsing over the results of FCT

FCT also contains a set of sample queries (the majority of them has been derived from the competence queries that have been used for evaluating MarineTLO). The sample queries can be found by selecting “Demo queries” in the upper right part of the homepage of FCT (Figure 6).

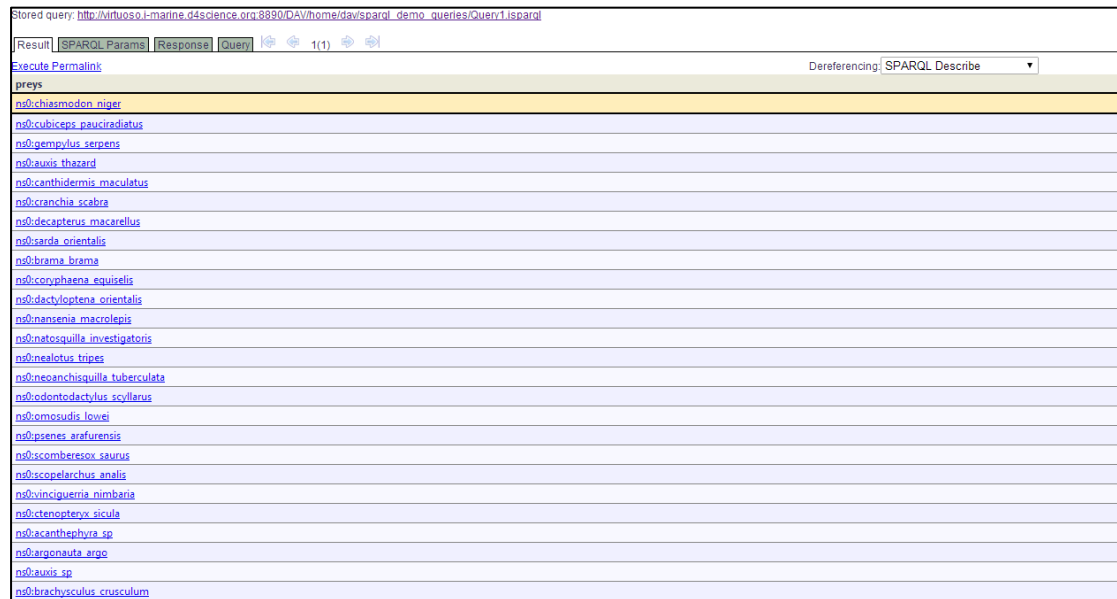
OPENLINK SOFTWARE Demo SPARQL Queries

1. Find the preys of "Thunnus Albacares".	Run with iSPARQL Run in SPARQL endpoint
2. Find the WoRMS classification of "Thunnus Albacares"	Run with iSPARQL Run in SPARQL endpoint
3. Find the predators of "Katsuwonus Pelamis"	Run with iSPARQL Run in SPARQL endpoint
4. Find the WoRMS classification of the preys of "Thunnus Albacares"	Run with iSPARQL Run in SPARQL endpoint
5. Find the references/images/db for "Thunnus Albacares"	Run with iSPARQL Run in SPARQL endpoint
6. Find more general terms for "Thunnus Albacares"	Run with iSPARQL Run in SPARQL endpoint
7. Find the identifiers (and the identifier types) of "Thunnus Albacares"	Run with iSPARQL Run in SPARQL endpoint
8. Find the competitors of "Thunnus Albacares"	Run with iSPARQL Run in SPARQL endpoint
9. Find the identifiers (and the identifier types) of the preys of "Thunnus Albacares"	Run with iSPARQL Run in SPARQL endpoint
10. Find the identifiers and the WoRMS classification of the preys of "Thunnus Albacares"	Run with iSPARQL Run in SPARQL endpoint
11. Find all the species	Run with iSPARQL Run in SPARQL endpoint
12. Find the scientific name, the assignment date and authority for "Thunnus Albacares"	Run with iSPARQL Run in SPARQL endpoint
13. Get the total number of species	Run with iSPARQL Run in SPARQL endpoint
14. Find the number of predators for each species	Run with iSPARQL Run in SPARQL endpoint
15. Find the species which are not predators of other species	Run with iSPARQL Run in SPARQL endpoint
16. Find the species which are not preys of other species	Run with iSPARQL Run in SPARQL endpoint
17. Find the preys (say X) of "Thunnus Albacares" and all the preys of X	Run with iSPARQL Run in SPARQL endpoint
18. Find the number of species for each Family	Run with iSPARQL Run in SPARQL endpoint
19. Find the biological environments in which the species have been introduced and more general descriptive information of them.	Run with iSPARQL Run in SPARQL endpoint
20. Find the common names of Thunnus Albacares and the complementary info of them.	Run with iSPARQL Run in SPARQL endpoint
21. Find the water areas and their FAO codes in which Thunnus Albacares is native.	Run with iSPARQL Run in SPARQL endpoint
22. Find the countries in which Thunnus Albacares lives.	Run with iSPARQL Run in SPARQL endpoint
23. Find the water areas and the associated FAO partitioning related to a country.	Run with iSPARQL Run in SPARQL endpoint
24. For a scientific name of a species, find the projection w.r.t Country, Ecosystem, Water Area and Exclusive Economical Zone.	Run with iSPARQL Run in SPARQL endpoint
25. For Thunnus Albacares find the projection w.r.t. Ecosystem and Competitor, providing for each competitor the identification information.	Run with iSPARQL Run in SPARQL endpoint
26. Find all the bibliography resources	Run with iSPARQL Run in SPARQL endpoint
27. Find all the Greek Common Names	Run with iSPARQL Run in SPARQL endpoint
28. Find the values of statistical indicators of species	Run with iSPARQL Run in SPARQL endpoint

POWERED BY VIRTUOSO LINKINGOPENDATA
 Copyright © 2009-2012 OpenLink Software

Figure 9: Demo queries

Each query can be executed by selecting Run with iSPARQL. Shows the results from the execution of the 1st demo query.



The screenshot shows a web interface for executing SPARQL queries. At the top, there is a 'Stored query' field with the URL http://virtuoso.i-marine.d4science.org:8890/DAV/home/davsparql_demo_queries/Query1.isparql. Below this are tabs for 'Result', 'SPARQL Params', 'Response', and 'Query'. The 'Result' tab is active, showing a list of 30 results. The results are displayed as a table with a single column containing URIs. The first row is highlighted in yellow and contains the URI `ns0:chiasmodon_niger`. The remaining 29 rows contain other URIs, such as `ns0:cubiceps_pauciradialis`, `ns0:gempylus_serpens`, and `ns0:brachysculus_cruscolum`. The interface also includes a 'Dereferencing' dropdown menu set to 'SPARQL Describe' and a '1(1)' indicator.

Result
Execute Permalink
preys
ns0:chiasmodon_niger
ns0:cubiceps_pauciradialis
ns0:gempylus_serpens
ns0:auxis_thazard
ns0:canthidermis_maculatus
ns0:cranchia_scabra
ns0:decapterus_macerellus
ns0:sarda_orientalis
ns0:brama_brama
ns0:coryphaena_equisetis
ns0:dactyloptena_orientalis
ns0:nanzenia_macrolepis
ns0:natosquilla_investigatoris
ns0:nealotus_tripes
ns0:neanchisquilla_tuberculata
ns0:edentodactylus_scyllarus
ns0:omosudis_lowei
ns0:psenes_arafurensis
ns0:scomberesox_saurus
ns0:scopelarchus_analis
ns0:vinciguerra_nimbata
ns0:ctenopteryx_sicula
ns0:acanthephyra_sp
ns0:argonauta_argo
ns0:auxis_sp
ns0:brachysculus_cruscolum

Figure 10: Results of the 1st demo query

References

- [1]. http://wiki.i-marine.eu/index.php/Top_Level_Ontology
- [2]. http://wiki.i-marine.eu/index.php/MarineTLO-based_warehouse
- [3]. <http://virtuoso.i-marine.d4science.org:8890/fct/>