

TermPortal: An OntoPortal-based Terminology Portal with OntoLex Support

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Abstract

Terminological resources are increasingly published as Semantic Web data using standards such as OWL, SKOS and OntoLex-Lemon. While existing ontology portal infrastructures provide mature support for publishing, searching and reusing ontologies and controlled vocabularies, they are less suited to resources that require explicit access to terminological information such as term entries, variants, translations, definitions and links between terms and concepts. This paper presents TermPortal, a deployed semantic terminology portal built as an extension of the OntoPortal infrastructure. TermPortal adds support for OntoLex-Lemon resources while preserving compatibility with OWL and SKOS vocabularies. The system provides a workflow for terminology publication, ingestion, indexing, search and reuse through both a Web interface and a REST API. Its OntoLex extension maps lexical entries, forms, senses and lexical concepts to internal resources that can be explored, searched and accessed programmatically. In addition, the portal supports terminology-oriented services such as annotation and vocabulary recommendation. TermPortal has been developed and deployed in the context of the TeresIA project, where it has served as a shared infrastructure for publishing, searching and reusing terminological resources produced by different terminology providers and project partners. The paper describes the architecture, OntoLex support, main capabilities, deployment context and current limitations of the system.

Keywords

OntoLex-Lemon, ontology portals, terminology search, vocabulary reuse, SKOS

Introduction

Terminological resources play an important role in the organization, publication and reuse of domain knowledge. They provide controlled access to the terms used in a given domain, their definitions, variants, translations and semantic relations. In recent years, these resources have increasingly been represented and published using Semantic Web standards, which make them easier to share, interlink and exploit across applications. Models such as OWL [W3C OWL Working Group \(2012\)](#) and SKOS [Miles and Bechhofer \(2009\)](#); [Baker et al. \(2013\)](#) provide widely adopted mechanisms for representing ontologies, thesauri and controlled vocabularies. OntoLex-Lemon [Cimiano et al. \(2016\)](#); [McCrae et al. \(2012\)](#) complements these models by introducing a richer lexical layer, in which lexical entries, forms, senses and lexical concepts are explicitly represented.

Ontology portals have become a mature infrastructure for publishing and accessing semantic resources on the Web. Platforms such as BioPortal [Whetzel et al. \(2011\)](#), AgroPortal [Jonquet et al. \(2018\)](#) and the broader OntoPortal ecosystem [Jonquet et al. \(2023\)](#); [OntoPortal Alliance \(2026\)](#) support catalogue management, metadata publication, versioning, search, annotation and programmatic access through Web APIs. These features make ontology portals particularly valuable as reusable infrastructures. However, terminology-oriented resources represented with OntoLex-Lemon introduce requirements that go beyond the usual concept-centred publication workflows of ontology portals. In traditional OWL or SKOS-based settings, terms are often

treated as labels attached to concepts. This is sufficient for many ontology browsing and retrieval scenarios, but it is limiting when the lexical dimension is central to the resource. Terminological data may require explicit access to terms, written forms, grammatical information, definitions, variants, senses and links between lexical units and concepts. If these entities are ingested as generic RDF resources, their specific role in the terminology is not properly reflected in the navigation, search and API layers of the portal.

This paper presents TermPortal, a semantic terminology portal designed to support the publication, search and reuse of lexically rich terminological resources. TermPortal is built as an extension of the OntoPortal infrastructure. Rather than replacing the existing portal model, it preserves its core capabilities for publishing and managing OWL ontologies and SKOS vocabularies, while extending the ingestion, indexing, navigation and API layers to support OntoLex-Lemon resources. The system has been developed and deployed in the context of the TeresIA project, where it has served as a shared infrastructure for publishing, searching

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and reusing terminological resources produced by different terminology providers and project partners.

The contributions of this paper are as follows:

- TermPortal, a deployed semantic terminology portal built as an extension of OntoPortal for the publication, search and reuse of terminological resources.
- An OntoLex-Lemon support layer that maps lexical entries, forms, senses and lexical concepts to navigable and searchable internal resources.
- A set of terminology-oriented capabilities, including vocabulary publication, lifecycle management, terminology search, annotation, recommendation and API-based reuse.
- A real-world deployment of TermPortal in the TeresIA project, together with a discussion of the current limitations of the system.

The remainder of the paper presents the system architecture and OntoLex support, describes its publication, search and reuse capabilities, reports its deployment in the TeresIA project, and discusses current limitations and future work.

System Architecture

TermPortal is built as an extension of the OntoPortal infrastructure rather than as a terminology portal developed from scratch. This design choice allows the system to reuse mature OntoPortal mechanisms for vocabulary publication, metadata management, versioning, search, annotation and API-based access, while focusing the contribution of this work on the support of lexically rich terminological resources represented with OntoLex-Lemon. TermPortal preserves the standard OntoPortal layers for the Web interface, REST API, semantic storage, indexing and annotation services. The main extension introduced by TermPortal is an OntoLex-aware processing layer that is integrated into the ingestion workflow. This layer identifies OntoLex-Lemon entities in the submitted RDF resources, maps them to internal resources, indexes them for search and exposes them through both the Web interface and the API.

The architectural design was guided by three requirements. First, OWL and SKOS vocabularies should continue to be processed through the standard OntoPortal workflow. Second, OntoLex-Lemon resources should expose lexical entries, forms, senses and lexical concepts as navigable, searchable and API-accessible resources. Third, the system should remain deployable in institutional environments using the containerized deployment model already supported by OntoPortal. This approach keeps TermPortal aligned with the OntoPortal ecosystem while extending it for terminology-oriented use cases. As a result, heterogeneous catalogues containing OWL ontologies, SKOS vocabularies and OntoLex-Lemon terminologies can be published and searched from a common access point.

OntoLex Support in TermPortal

The main functional extension introduced by TermPortal is the explicit support for terminological resources represented with OntoLex-Lemon. The modelling of terminological resources follows previous work on representing

Table 1. Main OntoLex-Lemon entities supported by TermPortal. Examples are taken from the UNTERM entry *institutional unit*.

OntoLex entity	Role in TermPortal	Example
Lexical Concept	Terminological entry, exposed with identifiers, terms or designations, definitions and semantic relations when available.	Concept defined as “an economic entity that is capable, in its own right, of owning assets, incurring liabilities and engaging in economic activities”.
Lexical Entry	Main term or designation used to represent a concept in a specialized domain, connected to forms, senses and evoked concepts.	English lexical entry: <i>institutional unit</i> .
Form	Written or morphological realization of a term or lexical entry, including written representation and language information.	Written form: “institutional unit”.
Lexical Sense	Link between a lexical entry and the concept it denotes in a given terminological resource, including usage information when available.	Sense linking the English entry to the Spanish equivalent <i>unidad institucional</i> .

terminological data with OntoLex-Lemon and Semantic Web standards [Martín-Chozas et al. \(2025\)](#); [Diez-Ibarbia et al. \(2025\)](#). Terminological data modeled with OntoLex-Lemon, similarly to SKOS, are represented as instances of the classes defined by the ontology. As a result, the traditional OWL visualization approach, which focuses primarily on classes and their relationships, is not well suited to representing OntoLex-Lemon data.

However, SKOS-based visualizations are not fully appropriate for OntoLex-Lemon either. While SKOS is centered on a single core class (`skos:Concept`), the OntoLex-Lemon core model is structured around four main interlinked classes (see Figure 1), each capturing a distinct aspect of lexical and terminological information. TermPortal addresses this limitation by introducing an OntoLex-aware processing and representation layer that makes lexical entities available as first-class resources in the portal. For the purposes of this work, terminologies are treated as specialized lexical resources. Accordingly, we define a mapping between the elements of a typical terminological resource and the corresponding components of a lexical resource, enabling their uniform representation and processing within the portal.

Supported OntoLex Entities

TermPortal currently focuses on four central OntoLex-Lemon entities: `LexicalEntry`, `Form`, `LexicalSense` and `LexicalConcept`. These entities were selected because they capture the core distinction between lexical units or term designations (i.e., Lexical Entries), their written realizations (i.e., Forms), their meanings and pragmatic aspects (i.e., Lexical Sense), and the concepts they designate (i.e., Lexical Concepts).

- A `LexicalConcept` represents the conceptual dimension of the terminological entry and can be

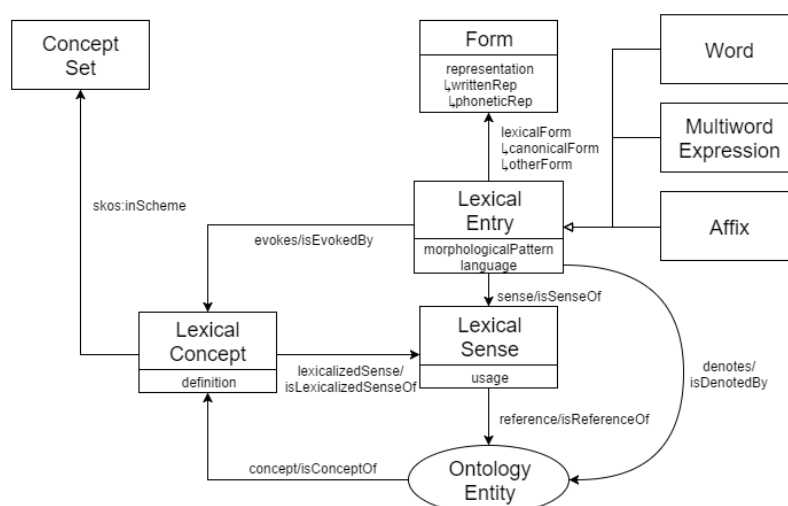


Figure 1. Core classes and relations of the OntoLex-Lemon model.

described using SKOS-like labels, definitions and semantic relations. In TermPortal, lexical concepts are exposed with their identifiers, terms or designations, definitions, and conceptual relations (such as hypernyms or hyponyms) when available in the source RDF.

- A `LexicalEntry` represents a term or designation, typically corresponding to a term in a specialized domain in a given language. It is treated as one of the main access points for terminology exploration. TermPortal exposes the canonical form of the entry, its language, grammatical information when available, the forms associated with it, its sense in the specific context of the terminological resource, and the concept it evokes.
- A `Form` represents a written or morphological realization of a term or lexical entry. TermPortal extracts written representations and language information when present such as the term's gender or number. This makes it possible to distinguish the lexical entry from the concrete forms through which it is expressed.
- A `LexicalSense` represents a specific meaning of a term or lexical entry and links lexical descriptions to conceptual resources. This class is associated with information concerning term acceptability (e.g., deprecated term), usage examples, usage notes, and semantic relations, including translation and synonymy.

Table 1 summarizes the main OntoLex entities supported by TermPortal and their role in the portal. On the other hand, Figure 2 shows the aggregated view of the different OntoLex classes.

Ingestion and Mapping

The ingestion of OntoLex-Lemon resources follows the general publication workflow of OntoPortal, but extends it with a dedicated parsing and mapping step. After a vocabulary submission is uploaded, the RDF graph is processed to identify the OntoLex entities supported by the system. Each detected entity is mapped to an internal resource that can be stored, indexed, exposed through the API and displayed in the Web interface.

The mapping process preserves the original URI of each resource and uses it as the stable identifier across the system. When human-readable labels or written representations are available, they are used for display and indexing. When not available, the URI is preserved and shown to the user rather than generating artificial labels. This design decision avoids introducing information that is not present in the source data and keeps the portal faithful to the original vocabulary. The parser follows an order that reflects the dependencies between OntoLex entities. Lexical concepts and forms are processed first, followed by lexical senses and lexical entries. This order ensures that, when a lexical entry is processed, the forms, senses and concepts it refers to have already been identified and can be resolved. As a result, the portal can provide direct navigation between related resources without requiring complex query resolution at interaction time.

TermPortal also supports multiple values for relevant properties. For example, a lexical concept may have several preferred labels or definitions, a form may have several written representations, and a sense may include more than one example or reference. These values are preserved during ingestion and exposed through the API. The system is also designed to tolerate incomplete vocabularies, since many OntoLex properties are optional and real-world terminological resources may vary in their level of detail.

Navigation and API Exposure

Once ingested, OntoLex entities become available through both the Web interface and the REST API. The interface provides multiple visualization tabs. It includes an aggregated view, designed for users who are not Semantic Web experts (e.g., terminologists), as well as four specialized views corresponding to the main OntoLex-Lemon components: Form, Lexical Entry, Lexical Sense, and Lexical Concept. Together, these views allow users to move from a vocabulary to its lexical entries, forms, senses and concepts. This is intended to make the structure of OntoLex resources understandable without requiring users to inspect the underlying RDF graph directly.

The API exposes the same resources programmatically. This enables external applications to retrieve lexical entries,

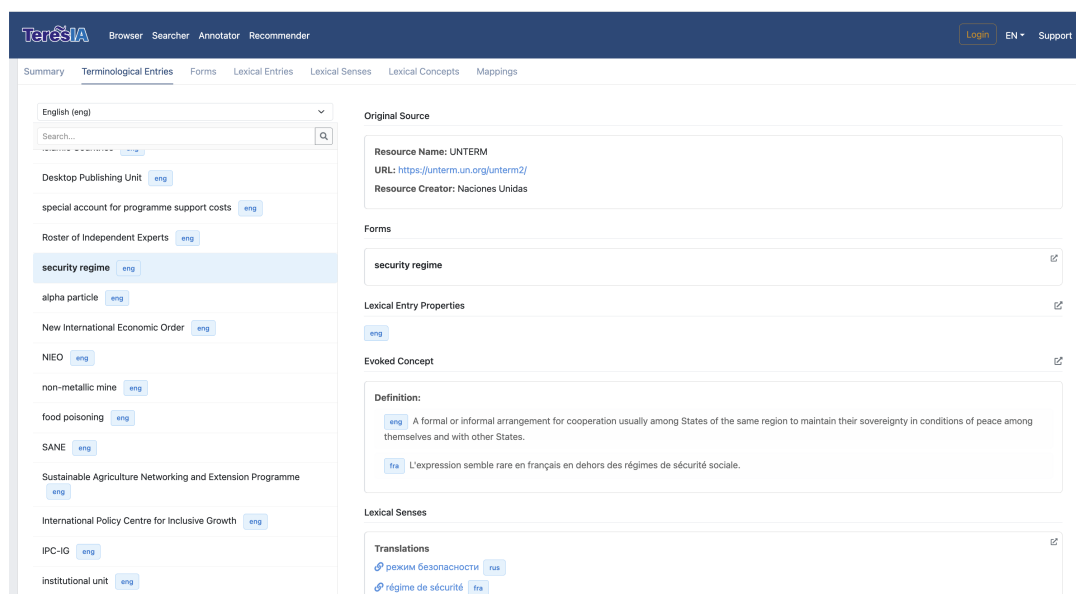


Figure 2. OntoLex-aware terminology exploration in TermPortal. The interface exposes terminological entries, forms, lexical entries, lexical senses and lexical concepts as dedicated navigation tabs.

inspect their forms and senses, access lexical concepts and integrate terminological information into downstream workflows. By exposing OntoLex entities through dedicated endpoints, TermPortal avoids treating them as opaque RDF resources and makes their terminological role explicit for both users and applications. This design also preserves compatibility with OWL and SKOS resources. Vocabularies that do not use OntoLex-Lemon continue to follow the standard OntoPortal processing workflow, while OntoLex vocabularies benefit from the additional lexical layer. TermPortal therefore supports heterogeneous catalogues in which ontologies, SKOS vocabularies and OntoLex terminologies can coexist and be searched from a common access point.

Publication, Search and Reuse Capabilities

TermPortal supports a set of capabilities that cover the lifecycle of terminological resources from publication to reuse. These capabilities are inherited from the OntoPortal ecosystem when possible and extended when required by the terminology-oriented and OntoLex-aware use case. The resulting system acts not only as a catalogue of semantic artefacts, but also as an operational infrastructure for searching, annotating and reusing terminology.

Terminology Publication and Lifecycle Management

The publication workflow starts with the creation of a vocabulary record in the catalogue. The user responsible for the resource provides basic metadata such as name, acronym, description, visibility and source file. The submitted file may correspond to an OWL ontology, a SKOS vocabulary or an OntoLex-Lemon terminology represented as RDF. Once submitted, the resource is registered in the catalogue and enters the ingestion and processing workflow. For OWL and SKOS resources, TermPortal preserves the standard OntoPortal publication process, including RDF processing,

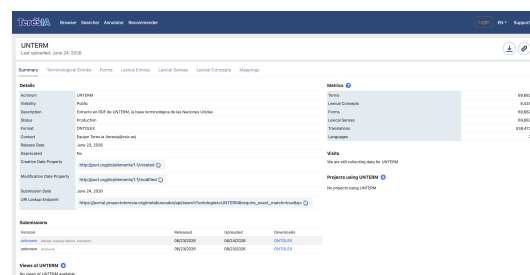


Figure 3. Vocabulary summary view for an OntoLex resource in TermPortal. The interface shows metadata, publication status, submissions, download options and OntoLex-oriented metrics for the UNTERM terminology.

metadata extraction, indexing and preparation for search and navigation. For OntoLex-Lemon resources, this process is extended with the parsing and mapping step described in the *OntoLex Support in TermPortal* section. After processing, the vocabulary becomes available through the Web interface and the API, allowing users and applications to inspect its metadata, browse its content and reuse its terminological entities. Figure 3 shows the vocabulary summary view for an OntoLex resource, including metadata, publication status, submissions, download options and OntoLex-oriented metrics.

TermPortal also supports vocabulary versioning. New versions of a resource can be submitted as updates of an existing vocabulary, preserving the distinction between the descriptive metadata of the resource and the RDF content of each submission. This is particularly relevant for terminological resources, where changes in lexical entries, forms or senses may affect several related entities. The system therefore operates as a publication and lifecycle management infrastructure, rather than as an advanced terminology authoring environment. It assumes that vocabularies have been created and curated externally before publication.

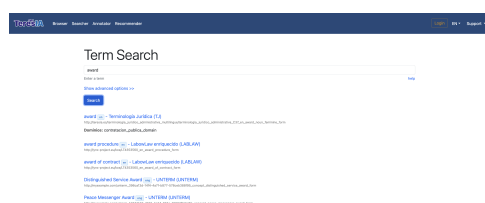


Figure 4. Terminology search in TermPortal. The search interface provides unified access to lexical and conceptual resources across the vocabularies published in the portal.

Unified Terminology Search

Search is the main access mechanism for users who need to locate terms and related entities across the catalogue (see Figure 4). Instead of requiring users to inspect each vocabulary separately, TermPortal provides a unified terminology search interface over the resources published in the portal. Search results include contextual information such as the vocabulary of origin and the type of resource retrieved, allowing users to continue the exploration from each result.

The search process relies on the indexing of selected entities and labels during ingestion. For OWL and SKOS resources, this includes the classes, concepts, properties and labels processed by the standard OntoPortal workflow. For OntoLex-Lemon resources, the index is extended with lexical entries, forms, lexical senses and lexical concepts extracted by the OntoLex-aware processing layer. As a result, the search service can retrieve both conceptual and lexical resources from a common access point.

The same functionality is exposed through the API, enabling external applications to retrieve terminological resources matching a query and integrate them into downstream workflows. In this sense, the search service acts as both a human-oriented metasearch interface and a machine-oriented access mechanism for terminology reuse.

Terminology Annotation and Vocabulary Recommendation

TermPortal provides two additional services aimed at exploiting published vocabularies beyond catalogue browsing. The terminology annotation service identifies occurrences of terms from the published vocabularies in free text. Given an input text, the service returns the matched terminological resources together with information about the matched fragment and its position in the text. For OntoLex-Lemon resources, written representations extracted during ingestion can be used as annotation candidates. The vocabulary recommendation service operates at the vocabulary level. Given a textual input, it suggests vocabularies that may be relevant for the content of the text and highlights within the provided text any terms identified in the vocabularies, enabling users to quickly recognize at a glance which terms are covered by each resource. Recommendation complements search and annotation: search retrieves resources matching an explicit query, annotation identifies terms occurring in a text, and recommendation suggests vocabularies that may be useful for interpreting or processing a given input.

Both services are available through the Web interface and the API. This makes them useful not only for

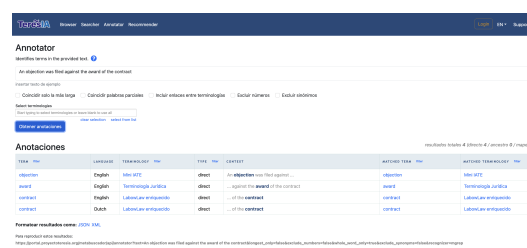


Figure 5. Terminology annotation in TermPortal. The annotation service identifies occurrences of terms from the published vocabularies in free text and returns the matched resources with contextual information.

interactive exploration, but also for integration into external workflows, such as document processing pipelines, terminology validation tools or applications that need to select relevant vocabularies dynamically.

API-based Reuse

A central goal of TermPortal is to make published terminology reusable beyond the portal interface. The API exposes vocabulary metadata, submissions, search results, annotations, recommendations and OntoLex-specific entities. External clients can therefore query the catalogue, retrieve lexical entries and related resources, search across vocabularies, annotate text and request vocabulary recommendations.

This API-based access turns TermPortal into an infrastructure component rather than a standalone Web application, enabling the transition from terminology publication to terminology exploitation.

Deployment and Use in the TeresIA Project

TermPortal has been developed and deployed in the context of the TeresIA^{*} project, a publicly funded Spanish collaborative initiative focused on the development of AI technologies for the creation, publication and exploitation of human-validated terminological resources. The current deployment is publicly available through the TeresIA portal[†] and provides both a Web interface for terminology exploration and API-based access for external applications.

Within TeresIA, TermPortal has served as a common access point for terminological resources produced or selected by different project partners. The TeresIA consortium includes CSIC (Spanish National Research Council), the coordinating institution, AETER (Spanish Association for Terminology), Instituto Cervantes (Spain's official organisation for promoting the Spanish language and culture internationally), OEG (Ontology Engineering Group at Universidad Politécnica de Madrid) and BSC (Barcelona Supercomputing Center). The system has supported publication, metadata inspection, cross-vocabulary search, terminology navigation, text annotation and vocabulary recommendation. The deployment also exposed practical requirements that are difficult to observe in isolated prototypes, such as incomplete metadata, heterogeneous modelling styles, URIs without

^{*}<https://proyectoteresia.org>

[†]<https://portal.proyectoteresia.org/metabuscador>

Table 2. Evidence of maturity and impact of TermPortal.

Evidence	Description
Public deployment	Available at https://portal.proyectoteresia.org/metabuscador/ .
Open source code	Source code available at https://github.com/proyectoTeresIA/portal .
Semantic Web standards	Supports OWL, SKOS and OntoLex-Lemon resources represented as RDF.
Terminology services	Provides terminology search, annotation, vocabulary recommendation and API-based access.
Project consortium	Used in the TeresIA project, involving CSIC, AETER, Instituto Cervantes, OEG and BSC.
Documentation	Usage, API, installation and deployment guides were produced to support operation and reuse.
Institutional deployment	Deployed beyond a local prototype and integrated into a public project portal.

human-readable labels, multiple lexical values and different levels of OntoLex-Lemon completeness. These requirements informed the design choices described in the *OntoLex Support in TermPortal* section. Table 2 summarizes the main evidence supporting the maturity and impact of TermPortal.

Discussion, Limitations and Conclusions

TermPortal shows how a mature ontology portal infrastructure can be extended to support terminology-oriented resources represented with OntoLex-Lemon. By building on OntoPortal, the system reuses existing mechanisms for publication, metadata management, versioning, search, annotation, recommendation and API-based access, while adding a lexical layer for exposing lexical entries, forms, senses and lexical concepts. This enables OWL ontologies, SKOS vocabularies and OntoLex-Lemon terminologies to coexist in the same catalogue and be searched, annotated, recommended and accessed through a common infrastructure.

The current implementation has several limitations. TermPortal is not a terminology editing environment: vocabularies are expected to be created, curated and validated before publication. The system also preserves the submitted RDF content and does not infer missing lexical information such as senses, variants, translations or grammatical features. In addition, the current implementation focuses on the core OntoLex-Lemon entities required for terminology exploration, while more advanced modules, cross-resource conceptual links and richer morphosyntactic descriptions require further mappings and interface adaptations. Finally, annotation and recommendation depend on the quality and completeness of the indexed lexical material.

The evidence reported in this paper comes from the deployment of TermPortal in the TeresIA project, which provides a real-world validation context involving heterogeneous terminological resources and institutional requirements. Broader adoption by external communities would provide additional evidence about scalability, usability and generality. Future work will focus on extending OntoLex-Lemon coverage, incorporating richer validation mechanisms and promoting reuse beyond the original project context.

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